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ORIGINAL ARTICLES.

DELIRIUM FROM NERVOUS SHOCK.¹

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UNDER the term delirium are included mental states characterized by psychomotor unrest, insomnia, clouding of consciousness, incoherence of speech, to which may or may not be added hallucinations, illusions, and unsystematized delusions. Delirium owns many causes. As a temporary complication of febriculæ, at the height of the fever, it is hardly considered a disease. Occurring later in the course of certain infections, notably typhoid fever, pneumonia, influenza, rheumatism, erysipelas and cholera, it has the characteristics of a true psychosis, and oftentimes a psychosis of very exhausting character. One of these characteristics is lack of high fever, which indicates the action of toxins rather than of bacteria. Similar in symptoms to these toxic cases are those which follow physical exhaustion generally, but especially such states of exhaustion as result from losses of large quantities of blood—notably after surgical operations and puerperal conditions.

While these psychoses are essentially of temporary character, the prognosis is not universally favorable. When they manifest themselves in brains markedly predisposed to insanity, the mental defects are often permanent; and when associated with conditions of great physical exhaustion, they not infrequently end fatally. Varying with the fancy of the classifying alienists, they have been given a variety of names, prominent among which are toxic insanity, acute exhaustion delirium, collapse delirium, confusional insanity, acute primary mental confusion, amentia, delirium grave and the like. It is probable that little more is indicated by this diverse nomenclature than the degrees of severity and the causes.

Thus amentia is mild and of favorable omen, while delirium grave, as described by Spitzka, is without exception fatal. Fundamentally, all these cases are similar in their symptoms—namely, in a delirium of varying degrees of activity, with the physical manifestations of debility, pinching of the features, dryness of the mouth and tongue, abnormalities in the heart action and gastro-intestinal disorders. Although not generally put there, traumatic delirium belongs to the above category.

Nearly all forms of insanity have head injury advanced as a cause, but the only variety that can

be regarded, with any degree of certainty, as resulting from *trauma capitis* alone, is traumatic delirium. This psychosis appears immediately or succeeds by a few days the unconsciousness due to the injury. In its symptoms and course it is hardly to be distinguished from deliria of other origins. Like them it has an uncertain prognosis, varying with the degree of injury to the brain and with the individual acted upon, alcoholism being the most important predisposing cause.

Another frequently mentioned exciting cause of delirium (especially of the type most frequently described as confusional insanity) is nervous shock, under which term are included sudden fright, grief, remorse, and perhaps even joy. This factor is one to which it is always difficult to ascribe an appropriate causal value; one, also, which is often invoked as a sole cause when it is really only one of many.

The importance of emotional factors in the causation of either somatic or mental diseases cannot be minimized. No one, be he physician or layman, can doubt the active part played in the production of disease by the contributing causes of the emotions. It is seen in daily social life, in the routine practice of medicine, and especially after great catastrophes and tragedies, such as explosions, battles, conflagrations, earthquakes, tornadoes, etc. In Reibal's paper descriptive of the Siege of Strasburg (*Gaz. Med. de Strasburg*, 1877, XXXVI, 86-91) a graphic account of such effects is given.

The bombardment of Strasburg lasted from August 15 to September 28, 1870. The terror to the inhabitants of the town was indescribable. Shells, bombs, fuses, were sent almost uninterruptedly into the heart of the city. To this were added the fires, which raged everywhere. At times the city streets were said to be practically full of molten iron and lead and burning débris. Reibal describes seven cases of cerebral disturbances, two of which will be again referred to, in which a fatal issue was the direct result of the bombardment. In at least four cases, the patients were already infirm. He also observed two cases, in women, of epileptic convulsions. Neither had had convulsions previously. In one case the convulsions disappeared—in another they became regular in occurrence. These convulsions were regarded as truly epileptic, and were differentiated from hysterical convulsions. Reibal also saw one patient in whom itching, as the initial symptom of a fatal diabetes, developed while she was huddled in a pit where she, with others, had sought refuge from the flying shells. Subsequently to the siege, also, he noted a great increase in the number of cases of diabetes; and of deaths, from cerebral causes, in infants.

¹ Read before the Clinical Society of the Elizabeth General Hospital, at Elizabeth, N. J., January 19, 1904.

But, important as emotional factors are in causation, to prove them unique factors is a different matter. Psychic shock may, doubtless, induce heart failure or apoplexy. But in such cases, vascular disease pre-exists. Sudden death with emotional factors as a cause is not mentioned in Brouardel's "Death and Sudden Death," and I feel safe in saying that the case is yet to be advanced in which life ceased as the immediate consequence of such causes alone. General medical diseases are rendered worse by emotional causes, and resistance to them is lessened thereby. But they do not originate in such causes, whatever the Christian Scientists may say to the contrary. Of the diseases of the nervous system, the neuroses are the only ones in which fright and similar causes are really important causes. Chorea commonly, and paralysis agitans and exophthalmic goiter in a few well authenticated instances, have been the unique results of fright. Squiers (*New York Medical Record*, 1887, XXXII, 190) reports the case of a girl frightened by a plate falling on her, in whom the pulse rate changed from 75-80 to 135, remaining at the latter rate for two years, up to the date of the communication. Fright figures prominently also, in the etiology of epilepsy, though it probably causes true epilepsy only in persons predisposed to the development of the epileptic habit.

Hysteria and neurasthenia are the neuroses in which emotional causes figure most prominently in etiology. In the majority of cases, associated with the fright or other similar cause, is some bodily injury, trifling though it may be. With this physical factor present, the emotional cause loses in importance more or less, varying with the personal equation of the observer. Thus, dependent upon the mental inclinations of different writers, the traumatic neuroses arise from causes chiefly material or chiefly psychic. (In litigated cases some bodily injury must be proved. Whatever the mental or moral effects of an accident may be, it is not a cause of action unless there be some bodily injury. See *Mitchell vs. Rochester Ry. Co.*, 151 N. Y., p. 107.) Either neurasthenia or hysteria may result when the causes are purely psychic, but in a large number of such cases marked predisposition of the affected person is demonstrable.

In insanity, with its complex and little understood etiology, it is well-nigh impossible to single out any one factor as the sole cause. Emotional factors operate here more commonly and more effectively than in somatic diseases. But the opportunities of error in assigning causes are great. Many forms of insanity, such as general paresis, in which we know there is an etiology distinct from the emotions, begin, in sequence to a nervous shock, with symptoms of delirium. When insanity begins in persons with marked predisposition, any apparent exciting cause loses greatly in importance. Recurrent psychoses set in quite commonly after the most trivial and (in themselves) inadequate causes. And many other

emotional disturbances in the predisposed occur in a way to make it evident that the symptoms are not the products of any exciting cause, but are merely the fluctuations of deep-seated disease, which appear either independently of exciting causes, or as the results of such disharmonies of existence as all mankind must undergo.

In studying the literature relative to this subject, I was surprised to discover how few cases there are in which insanity can legitimately be regarded as the result of nervous shock, the test being, absence of predisposition and other causes, and a nervous shock of great intensity.

It is the object of this paper to call attention to a few cases in which these conditions are fairly well fulfilled:

Case I.—This case possesses the advantage of being full in the important details bearing upon the patient before, during, and after the accident. The accident was the tunnel disaster in New York City on January 8, 1902, which was the result of a rear end collision on the tracks of the New York Central and Hudson River Railway. The patient, W., had been, prior to the accident, an active man without hereditary taint, and with no history of syphilis or alcoholism. He was fifty-four years of age, married, with healthy children. He had built up a large and lucrative business, in which he was the senior partner. He had general supervision of the business, made all the estimates for orders, and had personally conducted large exhibits at expositions, the last being the exposition at Buffalo. The following account of the accident is from his own recollection of it. It has been substantiated in all important details by statements of others. W. was in the rear car near the middle, seated alone, and was absorbed in planning the day's work when the train stopped. In about five minutes there was a terrific crash. The rear end of the car seemed to be lifted up and turned completely over. The top was broken in by the top of the tunnel. The next thing W. knew he was lying by the side of the engine that had run into the train from behind. He was pinned between the brick wall of the tunnel and the boiler of the engine in a space not more than two feet wide. He was lying by the side of the boiler with his legs pinned down and fastened in the debris. His feet were caught between the seats, which were jammed so closely together that he could not put his flat hand between them. The engineer asked if he should not back the engine, but was told that he would tear them all to pieces if he did. The steam escaped in volumes, and the heat was almost unendurable. The fear of being scalded and of fire was frightful. There were two ladies back of W., one of whom was screaming terribly, being badly lacerated, with ear hanging, and nose being driven up into the head. Her head was hanging through one of the arches of the tunnel, and she kept calling for some one to keep her from falling. W. reached back with his left hand, and with great difficulty straightened her up. He held her in this position for at least three-quarters of an

hour. There were others near him, screaming, one with the top of the car apparently resting on the top of her head. She screamed that she was dying. The steam came constantly up into her face. W. tried to lift the top of the car but could not. There were several dead bodies in the débris close by. In about an hour two men came with a crowbar, and began to pry open the seats. The ladies were taken out first, and the roof of the car cut open to let the steam out. The lower part of both of W.'s legs were crushed, and he could only lift them by taking hold of the lower part of his trousers. He was put on a stretcher and lowered to the tracks, carried up the tracks a way, and then up the steps and into a Bellevue Hospital ambulance. His suffering was almost unbearable, and lasted until he became unconscious when put in the ambulance. He did not regain consciousness until after entering the hospital. He remembers it, but it was all like a dark dream, and he does not know how much of what took place is real or the creation of his fancy. It seemed to him as if he were going into a slaughter-house.

These gruesome details are necessary to enable one to picture the terrific mental agony undergone by all who were conscious while imprisoned in the semi-darkness in which this tragedy took place.

At Bellevue Hospital W. was found to have compound fracture of both bones of both legs, without other surgical injuries. There were no scalp wounds or contusions about the head, and there is no reason to suppose that he had sustained any cranial injury. The day after admission to Bellevue Hospital he received a good many visitors, and on the afternoon of that day he went into a condition of partial stupor. After this condition had existed for a day or two, he was transferred to a private hospital in the care of Dr. John B. Walker, in consultation with whom I saw him on January 13, 1902. While in the private hospital, prior to my examination, his sleep had been much interfered with, he was out of his head most of the time, and muttering constantly, much of which was unintelligible. He was restless, but the crippled condition of his legs prevented him from getting out of bed. He would hold both hands up in front of his face, and say that he saw the headlight coming down on him all the time. There was no vomiting. To the questions I put to him at the first examination, he gave no answer, and it was only with difficulty that he could be induced to perform such simple movements as putting out the tongue, etc. He lay in bed with eyes closed most of the time. From time to time he would suddenly open them, raise himself up from the bed, hold his hands out in front of him with face averted, but would say nothing. For two days he had to be catheterized, and on one occasion had an involuntary passage of urine in the bed. The temperature never reached 100° F. There was neither suppuration nor pulmonary symptoms to explain the mental condition. The pulse varied from 80 to 108.

There was no paralysis of any cranial nerve nor of the hands. Both legs were in splints so the knee-jerk could not be examined. Two days later the condition was practically the same. In response to questions the patient would sometimes make inarticulate replies, and sometimes would not answer at all. He still made the movement of putting his hands before his face. He picked at the bedclothes, and his eyes wandered about the room. On January 16 he was somewhat better. He spoke to me, put out his hand, said "How do you do," and asked what my name was. He said that people were constantly coming to see him, but he did not know who they were. Said that the attendants had tied him down so tight yesterday that he couldn't make anything out of it. Many of his remarks were incoherent, but he evidently recognized people in the room, and appreciated the fact that his mind had been clouded for some time. On January 18 his mind was somewhat clearer, although he still did not know where he was, and could not remember names. He was tested at this examination for reading and writing. He was unable to read, and could not write intelligently at dictation. I next saw him on January 22. On that day he did not know the name of the hospital where he was, said he "remembered me from having seen me between two points in the North Shore." He said that one of his legs was splitting up into three branches, and the other had a "tap" on it. He thought he was setting out flowers. On January 29 there was evidence of great physical exhaustion, shown by very low tension pulse and weak systole. The mental state remained about the same, although at night he was apt to become very much excited. He began slowly to improve, and in the course of a few days, his mind became very much clearer. On February 8, however, he developed erysipelas, and with the fever accompanying this infection the symptoms of delirium returned, and were present for ten days or more. I did not see him again until June 13, 1902. He had left the hospital, had no further symptoms of delirium, and was able to get about a little on crutches. He said at that time he was sleeping well, that he only waked up two or three times during the night, and slept until five o'clock in the morning. This amount of sleep was still below his normal standard. His appetite, he said, was good; he had no headache, but was entirely unable to endure physical or mental effort. He had great tremor of the tongue and of the hands. He was able to read understandingly, but was inclined to slur over many words. Many simple words he did not understand, and some he could not read correctly. Thus, for *colleagues* he read *collect*, for *repudiation* he read *reputation*, for *directoriate* he read *directors*. In writing there was evidence of great tremulousness, and in very simple sentences he forgot to dot his i's. He left out letters, he left out words, and some letters he seemed entirely unable to make. Of simple problems given him in addition, multi-

plication, subtraction and division, the addition was correct, the multiplication was left incomplete, the subtraction was wrong, and the division he was unable to do. Asked to subtract mentally, 31 from 66, he said it was 29. In counting small change he made mistakes. Asked what day of the month it was, he said it was June 14, 1892. He then looked around to see if he was right with an air of uncertainty, and corrected himself to 1902. His memory for the time preceding the accident was perfect, and that for the time immediately after the accident good. But from shortly after admission to Bellevue Hospital memory was very defective.

My next examination, made on February 11, 1903, gave practically the same results as that of June, 1902. The patient complained of dreams of terrifying character, which woke him up in the night very much alarmed and frightened. Said that he had tried to resume his business, but had been obliged to give it up. He found that he was very inaccurate in his business transactions, and that being in business made him very much more nervous. He still had serious defects in that part of the mental sphere which has to do with language and numbers. He made mistakes in words and in reading, and after reading could not give the meaning of a simple sentence. In writing, also, he misused words in a way which destroyed their meaning. He said that he had not written any business letters since the accident. His speech was somewhat thick, there was tremor of the tongue, and there was also distinct interference with the intellectual mechanism of speech. He used words incorrectly, and many words he did not seem to understand. For example, he said "in revelation of" instead of "in relation to." Much that he read he did not seem to understand. When reading a few sentences about a yachting cruise, he thought it was an account of the Spanish War, and in reading about white duck suits, such as are worn in the tropics, he thought that the wearers of the suits got them to shoot ducks with. Given the same problems in arithmetic as at the previous examination he made the same mistakes.

My last examination made October 15, 1903, showed improvement in many ways, but no real change in fundamental conditions. He made the same mistakes in arithmetical problems, in reading and writing. With the exceptions previously noted, his memory was perfectly clear, although he was uncertain about many of his facts. He had returned to business, but was unable to take any active part in it. He said that he made so many mistakes in writing, that he now never wrote a letter unless some one read it over afterward, and that the making of estimates, which formerly had been his specialty, he was now entirely unable to do. He was unable to take orders over the telephone, as he had difficulty in comprehending what was said rapidly, and could not remember the orders when the telephonic communication was over. From the earliest period of his illness his mental state became worse on any

concentrated effort. When he began to clear up a bit from his original delirium, a few moments' conversation would cause him to relapse again into delirium. This condition of ease of fatigue is still present. He can do the first arithmetical problem quickly, and with better chance of being right, than he can the fourth. There have never been any hallucinations other than those incidental to the delirium, and never any fixed delusions. I feel no hesitancy in saying that exaggeration played no part in the case. There was none of the exaggeration of the ordinary neurasthenic type, as he vigorously combated and represented the idea that his mentality was affected. Neither was there any of the exaggeration so common in litigation. He took little interest in his claim for damages, which was settled without trial.

To briefly resume: A previously healthy man, after a severe mental shock, lasting about two hours, during which he is obliged to make muscular exertions and receives serious injuries of the extremities, passes into collapse delirium. This state, in addition to the ordinary mental symptoms of delirium, manifests itself by weakness of the muscles of the bladder, and by a weak heart. About to subside, it is again called into activity by a complicating infection. At its final subsidence the patient is left in good physical condition, but with the following mental defects: Slowness in perceptions, and indecision and instability of recent memory impressions; absolute uncertainty in the arithmetical faculty; decided impairment in the faculty of written and spoken speech. Such a mental state is distinct from the delusional one of hysteria. With neurasthenia it has more in common, especially in that it is aggravated in every way by fatigue. But the absolute mental defects in the case described are not found in simple neurasthenia. The neurasthenic is capable of all, though his capacity be of short duration. Our patient is in several respects incapacitated. The early and subsequent history of the case suggest a close analogy with the pathological mental states and their results occurring as the direct sequels of the infectious diseases, of surgical operations, and of conditions of exhaustion generally. With psychic shock as the chief etiological moment, we are obliged to assume an exhaustion of the cortical cells brought about by brief, but excessive, stimulation.

Case II.—Mrs. S., twenty-seven years of age; had always been normal mentally; gave no history of hereditary taint. She had been happily married for five years. One miscarriage, no children. On December 22, 1897, she saw her husband, to whom she was very much attached, walking on the street with a young and comely woman. From the other side of the street she watched the pair, until she saw them disappear in a house. She waited, and soon saw a light lit in one of the upper rooms of the house, and her husband come to the window and draw down the shade. When the husband returned to his own house, less than an hour afterward, he found his wife in tears and

unwilling to be comforted by any explanations he had to offer. She said her heart was broken, that she could never trust him again. She did not sleep that night, and the next day was still more disturbed. The condition of insomnia, grief, and agitation became progressively worse until, finally, I was called in consultation, five days after the occurrence, by the family physician, Dr. A. H. Ely. The patient was in bed, in seemingly good physical condition. There was no fever. She had passed no urine for twenty-four hours. The mental picture was that of confusion. The patient did not know where she was. Did not recognize that Dr. Ely and I were physicians, but took us for some of her former acquaintances. Said at one time that she had not seen her husband (who was in the room) for six weeks; at another, for three months. She had the illusion that strange people were in the room. When asked questions would make irrelevant replies. The occurrence which was the cause of the attack seemed to have disappeared from her mind. She could not be aroused to a realization of her surroundings. This condition of affairs lasted for two or three weeks; then the patient began to improve, and made a perfect recovery. Up to the present writing she has had no relapses.

Case III.—(Binswanger, "Ueber den Schreck als Ursache psychischer Erkrankungen," *Charité Annalen*, 1879).—Binswanger reports a case of a woman, who, although always timid and easily frightened, had never shown symptoms of mental alienation. There was no insanity in her family, and she had healthy children. On learning that one of her tenants had hanged himself in her house she fainted, but soon recovered herself. She then began to cry and bewail and could not be comforted. She continued to cry and moan, day and night, for five days, and then she began to wander in speech, and to throw herself about the room. She neither slept nor ate, and paid no attention to those about her. A little later her attention could not be aroused, the sounds she uttered were no longer intelligible, she sat rigidly with head between knees, offering resistance to any interference, including attempts to feed her. Ten days after the fright the bowels and bladder were evacuated involuntarily; the patient had not slept, but was tired and restless. On the eleventh day she died in coma. The autopsy showed multiple punctate hemorrhage in the cortex, in the cerebellum and on the base of the brain. Such pathological changes as were present in the cerebral blood-vessels were distinctly atrophic in character. There was no local arterial disease. The walls of the arteries were, however, weakened throughout, and Binswanger explains the case by assuming a sudden rise in blood pressure from the fright.

Case IV. (Landgraf: *Friedreich's Blätter für gericht. Medicin*, 1885, XXXVI, 458-65).—A little girl of 7½ years; a normal child, apparently, in every way, was frightened by two boys dressed up as ghosts. She rushed home, crying "Oh! my eye! My eye!" Without giving further explana-

tion she sank exhausted to the floor, vomited and went into severe general convulsions. These continued till the child died less than ten hours later. The municipal report (Bayreuth) stated that the autopsy showed no anatomical cause of death, other than an excessive distention of all the blood vessels of the brain and cerebral membranes.

Case V. (Manson: *Lancet*, 1846, II, 582).—A girl, 2½ years of age, previously normal, was greatly frightened on October 2 by a boy in a mask. She could give no explanation of the cause of her fright. She trembled violently, and all she could say was "The bogie, the bogie looked through the window at me." Her health declined rapidly. On October 14 she was restless, calling "Bogie, bogie." The next day she did the same, and went into convulsions which were confined to the diaphragm and face—sobbing and sighing—that evening she died. The autopsy showed great congestion of the brain and its membranes.

Case VI. (Reibal: *Gaz. Med. de Strasburg*, 1877, XXXVI, 86-91).—A physician was suddenly forced to leave his house which had been set fire to by a bomb. He soon developed terrifying hallucinations with insomnia and agitation, which gave place to coma and paralysis. He died in five days.

Case VII. (Reibal: *Op. cit.*).—A boy of ten was frightened by a cannon ball, which passed close to his head. He ran home, but was immediately taken with chills, vomiting, delirium and convulsions, and died in a few hours.

The above cited cases give a general idea of the character of the symptoms, and the variations in their severity, which result from nervous shock in presumably normal persons.

The mental symptoms are essentially delirious. In severity, they vary, from slight and transient attacks of mental confusion, to profound disturbances of consciousness with the physical symptoms entailed thereby.

In outcome, there may be complete and permanent recovery, or recovery with defect, or as shown in the very instructive case of Binswanger, the symptoms may become progressively worse and end fatally.

Into more specific statements regarding the clinical behavior of these cases it seems impossible to go. They are, in the first place, too infrequent to permit of generalization. Further, the two causal factors, the exciting moment and the individual acted upon, are so extremely variable, that a large number of collected and assorted instances would be necessary before any definite deductions could be drawn. As has been said, such a number of cases is not available.

While the pathology of delirium from nervous shock is entirely in speculative domains, there are strong reasons to suppose that it is closely connected with disturbances in the cerebral circulation. Certain it is that evidences of disturbed circulation are always present. In fright, the blood first leaves the

body surface, there is tumultuous and rapid action of the heart, and probably an increase in blood pressure. Increased blood pressure in frightened animals has been demonstrated by Conty and Charpentier and by Bezold and Dainlewsky. (See Werner, "Ueber die Geisteskrankheiten nach Kopfverletzungen," *Vierteljahrsschrift für gerichtl. Med.*, 23, 1902.) After the initial period of excitement, the effects upon the circulation are different, doubtless, in different cases. In some there is persistent tachycardia. In others the pulse is slow. A fall in blood pressure follows the initial rise. Vascular instability is shown in the changing character of all the symptoms.

As has been said, the symptoms of delirium from nervous shock are strikingly similar to those of the insanity characteristic of head injuries. It is highly probable that traumatic delirium is due, not to the mechanical disarrangement of brain constituents, but to changes in blood supply and pressure, and in brain pressure.

It seems reasonable to suppose, therefore, that traumatic delirium and the delirium from emotional causes are closely allied in pathogenesis, as they are in their clinical aspects.

A NEW PORTABLE SPHYGMOMANOMETER; ALSO A BLOOD PRESSURE CHART.¹

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It is with considerable reluctance that I added to the rather long list of instruments for determining human blood pressure, but, after using almost all the previous forms, my desire to possess one which could be easily taken about in my hand-bag, and yet be substantial and accurate, impelled me to do so.

The main defect of most of the existing sphygmomanometers, which use Riva-Rocci's method of circular compression, is too small width of compressing surface. Von Recklinghausen, in 1901, demonstrated conclusively that no armlet less than 12 cm. wide can give accurate readings in arms much above the average size. No instrument with such an armlet was obtainable when I began my experiments, but Erlanger has since modified his excellent, though scarcely portable, apparatus by the introduction of a cuff of this width, and Stanton has brought out a fairly satisfactory instrument, with a compromise armlet of 8 cm. Apart from these, no portable apparatus used rigid tubing, or a wide enough caliber of manometer tubing to allow satisfactory transmission of the pulse wave, and the estimation of diastolic pressure. Under certain circumstances, especially for diagnostic purposes, this is of distinct value.

For my purposes I solved the problem of combining portability with accuracy, by not attempting to pack all the parts of the apparatus in one case. The armlet and inflating bag are not break-

able, and can be carried with the case containing the manometer in an ordinary instrument bag. It seemed unlikely to me that any one would carry a sphygmomanometer without also taking some other instruments, and therefore a small hand-bag, with him. All the parts together weigh only 2½ pounds, and the manometer case measures 10¼ inches in length.

The instrument, as shown in Fig. 1, consists of three essential parts:

(a) Manometer, of U-tube form, with upper part jointed, fixed to the under side of case lid. The scale is graduated empirically for each manometer, since even-calibered tubing cannot be had in this country. The caliber used is 3 mm. The jointing of the manometer tube is copied from Cook's ingenious instrument.

(b) Compressing armlet, consisting of a hollow rubber bag, 12 by 18 cm., with a valve-stem for connecting with manometer. This is provided with a loose thin cover, for protection, and is attached to an outer leather cuff, which fastens by two encircling straps with friction buckles. This arrangement of straps was the fruit of considerable thought and experiment, and, in my hands, has proved a satisfactory method of fitting arms of all sizes with the same cuff.

(c) Inflator, an eight-ounce Politzer bag with valve. This was first used for the purpose by Erlanger, though without the valve, which has become necessary with the large armlet. Heavy pressure tubing is used for the connections. The technic of the instrument follows:

To set up the Manometer.—Unhook the lid and pull it up until it stands plumb. Drop the catch on each side behind and push the hook over the pin on brace to left, thus fastening the manometer securely in an upright position. Push the brass stop-cock (E), which contains a needle-valve, through the hole in the front of the case. Attach tube and Politzer bag (C) to it. Insert the upper joint of manometer tube, giving it a twist to make sure that the joint is tight, and slip the rubber band over the top. Slide up the scale until the O point is level with the top of the mercury column in both tubes.

Directions for Use.—Adjust the armlet carefully above the elbow, the outlet tube over inner border of biceps. If the arm is very small, the straps will have to be passed over the slits on the end of the cuff which laps inside, not through them as usual. For children the thigh may be used. Have the cuff fit as snugly as possible without squeezing. Observations may be made with the patient either lying or sitting, but should always be in the same posture. In either case the armlet should be at the level of the heart. The patient must be at rest, as exertion, excitement and apprehension all raise the blood pressure. With one hand feel the radial pulse. With the other squeeze the Politzer inflator until the pulse disappears, then release the pressure very slowly and note the height of the manometer column at the moment the pulse is again perceived. Immediately raise the pressure just

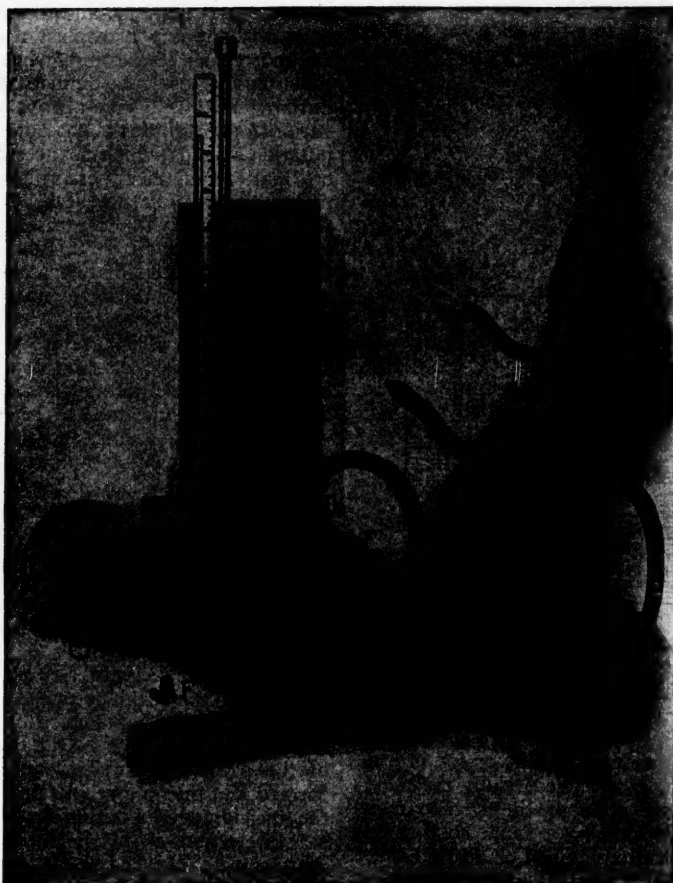
¹ Received for publication April 6, 1904.

enough to obliterate the pulse and make a second reading as it is released again. The average of these two gives the systolic arterial pressure. (Criterion of Vierordt and von Basch.)

If difficulty is experienced in controlling the pressure with the hand, close the stop-cock (E), when the pulse has been obliterated. By manipulating the stop-cock the air may be allowed to escape slowly through the needle-valve and the reading easily made. It is quicker to work with the hand alone, but requires a little practice,

the pulsation of the mercury column at each point. This will increase for a time, then continue of same extent for some millimeters. At a definite point the height of pulsation will decrease rapidly. The last point at which it is greatest is the diastolic pressure (criterion of Marey and Mosso). Two measurements of this should be made. Unless a pulsation of 5 mm. is obtained, no accurate measurement is possible. This happens in rapid or very small pulses and with too loose adjustment of the cuff.

FIG. 1.



Sphygmomanometer in Operation.

When the tension is high, the air in the Politzer may be insufficient to give the required pressure. In such cases, close the stop-cock, allow bag to refill, then, while squeezing it, open the stop-cock and raise the pressure as high as desired. With high pressure, be sure the upper joint of manometer is tight.

To Estimate the Diastolic Pressure.—After obtaining the systolic, allow the pressure to fall 5 mm. at a time through the needle-valve, watching

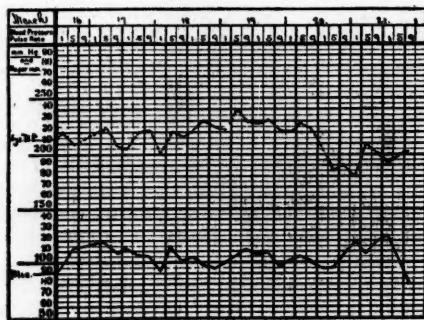
To Close the Manometer for Carrying.—Remove upper joint and place it in the rings to right. Insert cork (F) firmly in open end. Unhook the brace, drop catches at back, and shut the lid, locking it tight. The rubber joint (G) is automatically closed by a block at bottom of case. The stop-cock is to be caught under spring (H). If the mercury column breaks in carrying, shake it down before removing the cork. To fill manometer, use a medicine dropper, and, if drops do

not go down freely, run a thin wire through the tube to insure their passage into liquid below.

This sphygmomanometer is now being made for any who desire it, by Chas. E. Dressler and Bros., 143-145 East Twenty-third Street, New York City. Mr. Dressler has been of great assistance to me in solving many of the mechanical difficulties met with, which required several months' time to overcome. The needle-valve is his own construction. My own instrument has now been in use for three months and has proved quite satisfactory. In the hospital, like every instrument I have ever had there, it has suffered too much from careless usage, and I have had made a more substantial one piece manometer, without a folding case, for service in my wards. In other respects it will be found to be the same instrument.

In my hospital work I found it so difficult to obtain satisfactory blood pressure records, either on modified temperature charts, or on any of the engineer's ruled papers, that I devised the accompanying chart for the purpose (see Fig. 2). Its

Fig. 2 (reduced).



important features are: legibility at a distance; a single column of figures for blood pressure and pulse rate (also respiration if desired), so that mistakes in charting cannot occur; availability for observations at short intervals, or for b. i. d., q. 4. h., or q. 3. h. records; especially the adoption of the ordinate scale of the U-tube manometer tracing, 0.5 mm. = 1 mm., so that the curve of blood pressure obtained clinically can be compared exactly with tracings made in the physiological laboratory, and are not distorted by a purely arbitrary spacing. In use, systolic pressure is recorded by a solid red line; diastolic, broken red; pulse rate, solid blue or black; respiration, broken blue or black. At operations a double-ended pencil, red and blue, makes a chart which can be read across the room. These are made for me in blocks of fifty by George W. Buskirk, Sixth Avenue and Thirty-fourth Street, who is prepared to supply them to any gentlemen who desire to procure these accurate and convenient charts for recording their observations.

36 West Fortieth Street.

OSTEOPLASTIC AMPUTATIONS.^{1 2}

BY ALEXIS V. MOSCHCOWITZ, M.D.,
OF NEW YORK;

ADJUNCT ATTENDING SURGEON TO MOUNT SINAI HOSPITAL.

THIS article is based upon the following major amputations by osteoplastic methods, which I have had opportunity to perform on the First Surgical Division of Mount Sinai Hospital since May 18, 1900. One amputation of the thigh; one Ssabanejeef amputation at the knee; three amputations of the leg; one amputation at the ankle-joint; one Pirogoff amputation; and one amputation of the thumb. In addition I have also had occasion to perform a number of pure and simple exarticulations, and a number of amputations without any osteoplastic procedure, which are more than interesting, when studied in conjunction with osteoplastic methods. Furthermore, during this time I have always availed myself of various opportunities to carefully examine all amputation stumps which chance threw in my way, no matter whether performed by osteoplastic methods or not, so that, I believe, I am now entitled to speak with less reserve than when my first communication on this subject appeared, in the MEDICAL NEWS of February 9, 1901.

It is not essential for my present purposes to go into details in the presentation of my cases; I shall confine myself therefore to the briefest possible abstract from their histories, and to a severe criticism of the ultimate outcome in those cases in which it is indicated.

Case I.—A. T., eighteen years of age, was admitted to the hospital January 11, 1900. There was a long antecedent history of tuberculosis of the left ankle-joint, and many operations had been performed for its cure. Osteoplastic amputation in the middle of the leg performed May 18, 1900; followed by primary union, and patient was discharged June 10. The result is perfect, not the slightest pain or tenderness; patient wears an end-bearing artificial leg.

Case II.—B. D., thirty-two years of age, was admitted to the hospital June 21, 1900. Diagnosis, gangrene of anterior portion of foot due to Reynaud's disease. June 29, at the express request of the patient, a Pirogoff amputation was performed, but the gangrenous process soon involved the incision, necessitating an amputation at the seat of election on July 7. Patient was discharged August 15. The bad result in this case was due to an error of judgment, which led me to accede to the wishes of the patient for a low amputation, while only a higher one was indicated. Certainly no blame for its occurrence is to be attached to the method.

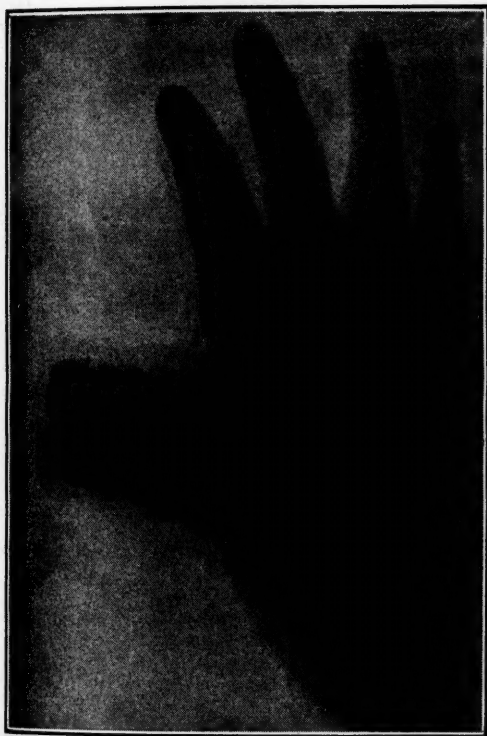
Case III.—B. A., thirty-four years of age, was admitted to the hospital August 7, 1900, with gangrene of the right foot due to Reynaud's disease. August 11 amputation of the leg by the Ssabanejeef method. The operation was easily and rapidly performed, and was not followed by any

¹ Read by invitation at a meeting of the Waterbury, Conn., Medical Society, March 14, 1904.

² Received for publication April 27, 1904.

shock. Four and one-half hours after operation the temperature rose to 107.5° F., and one hour later to 108.5° F.; in spite of energetic treatment patient succumbed soon thereafter. At autopsy nothing of consequence was found. August 11, 1900, was a particularly hot and muggy day, and we came to the conclusion that the fatal outcome in this case was due to insolation; this view is borne out also by the fact, that another case (radical operation for inguinal hernia), operated upon on the same day, was followed by the same train of symptoms. Certainly no blame for the fatal outcome is to be attached to the particular method of operation.

Fig. 1.



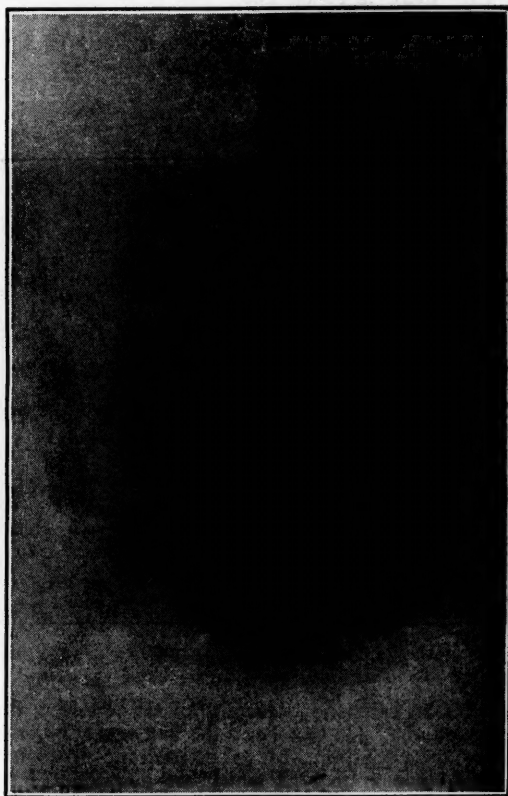
Osteoplastic Amputation of Thumb.

Case IV.—W. K., twenty-five years of age, was admitted to the hospital August 14, 1900, with an infection of the interphalangeal joint of the left thumb. The joint was incised and drained, but the adjoining surfaces necrosed, necessitating an amputation, which was performed August 25 by the Bier method. On account of the extensive infection secondary sutures were used, and but very little hope was entertained for a good result. We were agreeably disappointed, however, as the bone flap united, and, after tying the secondary sutures, primary union resulted. (Fig. 1) Patient was discharged cured September 2. Some two years later I had occasion to examine the stump

and found it to be absolutely devoid of pain or tenderness.

Case V.—A. S., fifty-six years of age, was admitted to the hospital October 30, 1900, with a rapidly growing sarcoma of the big toe. November 2 amputation in the upper third of the leg by the Bier method. A marginal necrosis of the bone flap occurred. On account of metastases it was deemed most wise to hasten the closure of the sinus by removing the flap on January 20, 1901. Patient was discharged March 3, 1901. At the secondary operation we have gained the impression that in due time the necrotic areas would have become exfoliated, leaving ample covering

Fig. 2.



Osteoplastic Amputation of Leg.

for the sawn surfaces of the tibia and fibula, and in no way marring the ultimate result; but on account of extensive metastases it was not deemed worth while to wait for a separation of the necrotic areas.

Case VI.—M. R., nineteen years of age, was admitted to the hospital June 3, 1901, with a tuberculosis of the right ankle. The joint was resected on June 7, going wide of the diseased area, but in spite of this there was a recurrence, necessitating a number of secondary operations.

Finally the case came to an amputation, which was performed October 21 by the Bier method. (Fig. 2) Primary union resulted and patient was discharged cured December 4. Several months later I had occasion to examine the stump and found it to be perfect in every detail.

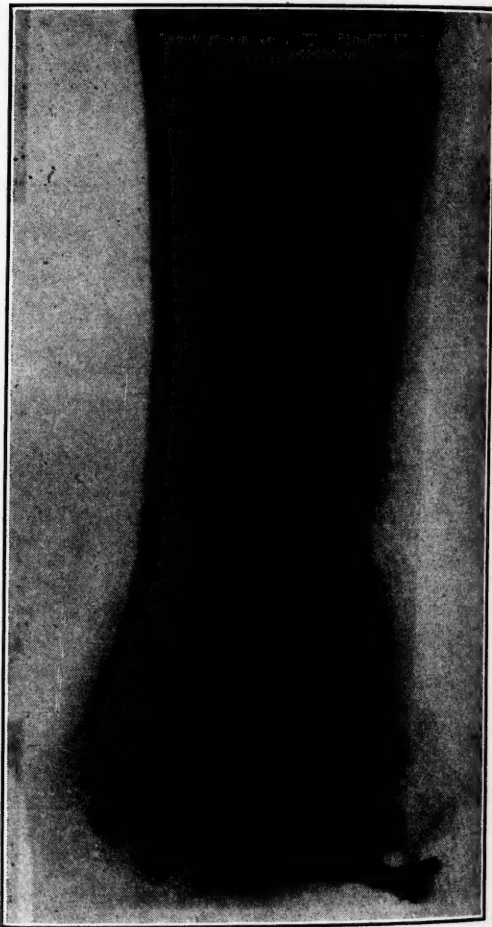
Case VII.—R. H., thirty-two years of age, was admitted to the hospital May 5, 1903, with a spontaneous fracture of the tibia, caused by a rapidly growing sarcoma. On May 11 the thigh was amputated by Bier's method. (Fig. 3) Primary union resulted and patient was discharged cured June 7. Patient wears with perfect comfort an end-bearing artificial prosthesis; the stump has not atrophied, and is neither painful nor tender in the slightest degree. In the skiagraph of the case there is to be noted the large amount of callus between the apposed bone surfaces.

Case VIII.—J. K., twenty-three years of age, was admitted to the hospital September 27, 1903,

only by the addition of an artificial prothesis, which is to act as a substitute for the amputated portion of the extremity. By the addition of such artificial prothesis the important physiological functions of "support and locomotion" are derived.

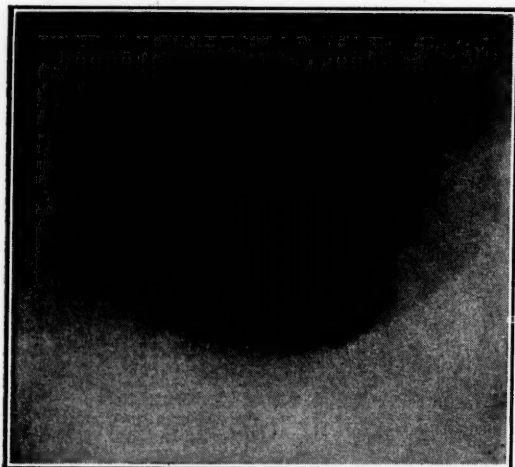
If the normal physiological function of an amputation stump is of importance, a disturbed physiological function is of still greater moment to individuals who have been unfortunate enough

Fig. 4.



Osteoplastic Amputation at Ankle-joint.

Fig. 3.



Osteoplastic Amputation of Thigh.

with an extensive deformity of the left foot, due to trauma. On October 2 the foot was amputated at the ankle-joint, by an osteoplastic procedure, the various steps of which are described in the *Annals of Surgery* of May, 1904. (Fig. 4) Patient was discharged cured January 17, 1904. The stump is perfect in every detail, and patient wears an artificial prothesis, which is only very little different from an ordinary shoe.

The main object of this article is to prove the superior advantages of amputation stumps formed by osteoplastic methods, as opposed to stumps formed by the older methods; but in order to do so understandingly, it is necessary that I digress for a moment, and discuss, if ever so briefly, the physiology and pathology of amputation stumps.

Strictly speaking an amputation stump has no physiological function in itself; whatever physiological function is ascribed to a stump is done

to require an amputation; and as all amputation stumps, performed no matter upon which part of any extremity, may become pathological, it is important to pay just as much attention to stumps of the upper extremity as to those of the lower extremity. It is not my aim to weary you with a detailed description of the various pathologico-anatomical conditions to which amputation stumps are liable; suffice it to say, for our present pur-

pose, that there are certain symptoms common to all, and the most important of these is, pain or tenderness, or both. The importance of these two symptoms is due to the fact that it is their presence which prevents the respective amputation stumps from fulfilling their normal physiological functions of "support and locomotion."

To recapitulate, therefore, it might be said, that a stump is perfect and to be looked upon as normal, only when it is fully able to carry on its physiological function of support and locomotion; every other stump, which does not or cannot conform to these requirements is abnormal and pathological.

One would think that these simple facts ought to be universally accepted as true, particularly when it is considered that the operation for ablating an extremity is one of the oldest known to surgery; but this is not the case; on the contrary, the opinion was prevalent that there are certain ills inherent to amputation stumps, which must be accepted as one of the evil consequences of the operation. It is practically only within the past decade that the dawn of a new era began to assert itself, and more and more attention is beginning to be paid to a good physiological function of the stump.

The question arises, therefore, which one of the various structures which enter into the composition of a stump forms the deciding element as regards its good or bad function; as it is only by knowing this element that we can take steps, either for its preservation or exclusion. Every one of the more important structures, which enter into the formation of a stump have at one period or another been blamed; it is necessary, therefore, to critically examine all, viz.: (1) The integument; (2) muscles, tendons and fasciæ; (3) the nerves; (4) the cicatrix; (5) the bone and periosteum.

1. *The Integument.*—For a long time the skin which covers the stump was looked upon as the most important factor; and many operative incisions were designed, mostly with the object in view to obtain the most suitable integument for covering the stump. It was particularly stated that only such skin can be utilized effectively which is designed by nature for pressure; to prove the fact that only such skin can be utilized effectively, there were pointed out the good function of the well-known Pirogoff and Gritti stumps, in the former of which the integument covering the stump being taken from the thick skin of the heel, and in the latter from the thick skin covering the patella; the good function of these stumps, however, as will be shown later, depends wholly upon a different principle. Furthermore, it has been repeatedly proven, that stumps in other respects well made, but covered with the thinnest and most delicate skin (e.g., in one case of Bier from the thin skin covering the tendon of Achilles), will be able to withstand the greatest pressure; and in addition it has also been found that every skin, provided the function of the stump is good, will eventually hypertrophy, so as to resemble

skin designed by nature for pressure. In one of my cases (amputation at the middle of the leg) the skin is so thick as to make an unsightly, but nevertheless perfect stump as far as function is concerned. We must, therefore, arrive at the conclusion that the integument is not the deciding factor.

2. *Muscles, Fasciæ and Tendons.*—Another structure which engaged for a time the attention of surgeons was the musculature covering the stump; and the theory was propounded, that a stump in order to be functionally good must be liberally covered with heavy muscles, which would act as a buffer. This gave rise to a number of operative procedures (particularly the transfixion methods), all designed with the object in view to cover the end of the stump with large and heavy muscles. The results were stumps beautiful to look at when of recent origin, but in the course of time this also proved to be futile, as it was soon found that even with heavy muscular cushions, pressure, particularly if continued for a long period, soon became unbearable; and in addition all the muscles very soon atrophied, the atrophy persisting in spite of energetic massage, the use of electricity, etc. This occurrence is well known to everybody; there is no necessity, therefore, to bring many examples; it is only lately I have had occasion to examine a stump of the thigh in an adult, the muscles of which were so atrophied that the diameter at the middle of the thigh was only two inches, and the end of the stump was so tender that the patient winced with pain at the slightest tap of the finger.

This muscular theory is disproven also by the fact that there are in existence a number of amputation methods (e.g., Stephen Smith, Pirogoff) in which there is not a trace of muscle covering the end of the stump, and yet functionally these stumps are simply ideal. What has been said of the muscles is equally true of the less important structures of tendons and fasciæ. I am fully aware that the only lately Dietel (*Deutsche Zeitschrift für Chirurgie*, February, 1904), published a few good results, which were obtained by covering the stump with tendons, but my experience will not bear this out.

3. *The Nerves.*—The nerves in a stump have engaged the attention of surgeons for a very long time, and in a measure with more right than any of the structures yet mentioned, because one of the diseases to which the stumps are peculiarly liable, depends particularly upon a pathological condition of the principal nerve trunks. It has been known for a long time that nerves divided in an amputation, particularly when they become adherent to the resulting cicatrix, are very prone to develop painful neuromata, and even were the stump functionally perfect in other respects, the presence of such a neuroma would be amply sufficient to frustrate its perfect physiological function. In a majority of instances, however, the prophylaxis of such an occurrence is readily at hand, as all that is necessary is to carefully isolate the nerve trunk during the operation, to draw

it out as far as possible, and to divide it at a higher level. In a few rare instances a painful neuroma develops in spite of this procedure, and for the cure of these cases Bier has proposed a neuroplastic suture to be carried out on the principle of his osteoplastic procedure. Personally, I have also seen a few pathological stumps, which were due in part to a fault of the divided nerves, and their occasional occurrence cannot be denied, but the greatest majority is certainly due to other causes.

4. *The Cicatrix.*—It is a well-known fact that scar tissue is less resistant and more tender than normal tissue; this is very probably due to an enclosure of the finer sensory nerve endings, and their compression by the natural contraction of the cicatrix. The cicatrix was therefore looked upon as one, if not the main, cause of painful and tender amputation stumps; nor can it be denied that there were certain grounds for this supposition. Acting upon this theory, in order to avoid any exposure of the cicatrix to pressure, numerous incisions were devised, mostly of the variety of two unequal flaps; these when sutured, placed the resulting scar to one side of the end of the stump, where it naturally was less liable to pressure than if placed directly upon the end of the stump.

This, as one might say, physiological property of cicatricial tissue must and should be taken into account as far as possible in all amputations, but it should never be of sufficient importance to sacrifice any of the length of the stump to it, because it applies more particularly only to the massive cicatrices of secondary union; the non-adherent linear cicatrices of primary union either do not have this quality at all, or to so slight an extent, that for practical purposes it may be entirely disregarded. I have personally performed amputations, the stumps of which were perfect as far as end-bearing function was concerned, in spite of the fact that the scar was placed directly upon the end of the stump. We can safely say, therefore, that the presence of the scar is not the deciding factor in the proper construction of amputation stumps.

5. *The Bone and Its Periosteal Covering.*—These are the structures which I believe to be of the greatest importance, and which must be discussed at somewhat greater length. It would be altogether erroneous to believe that end-bearing stumps are an innovation in surgery; on the contrary several were known for a long time, but they were not properly interpreted. The simplest of these were the pure exarticulations; it was universally acknowledged that the exarticulation stumps formed in a pure and unadulterated fashion functionated perfectly; but they were erroneously interpreted, as on their account the theory was propounded that only such amputations were followed by a good result which were performed through the comparatively broad epiphyses. That this was an error and misleading in many ways is well evidenced by the fact that there are many amputations in which the section of bone is car-

ried out through the broadest kind of an epiphysis, and yet the functional result is poor. And still amputations of this nature are highly commended in all text-books.

Permit me to call your attention here only to the well-known Carden amputation through the condyles of the femur. In this operation, the section of the bone is carried through the massive and broad condyles of the femur. Good function is claimed for the Carden stump, because "its extremity is well calculated for sustaining pressure, both on account of the breadth of the cut surface of the bone divided through the condyles, and from the character of the skin habituated to similar treatment in kneeling." (The Operations of Surgery, Jacobson and Steward, Philadelphia, 1902). Koenig (Lehrbuch der speciellen Chirurgie) also praises the exarticulation, but in comparing the exarticulation with the transcondyloid amputation, says that the latter often does as much as an exarticulation, as it offers the patient a point of support, upon which he can press directly with a prothesis. Both from experience and on account of theoretical reasons I would be inclined to doubt the great value of this operation. My personal experience with it is limited to the following case:

Case IX.—O. S., fourteen years of age, was admitted to the hospital May 8, 1899. Patient had a very large sacral myelomeningocele, and as a result of this was suffering from paralysis of the lower extremities, with extensive trophoneurotic ulcerations. On account of the extreme deformity an amputation at the knee was decided upon, and was performed May 22, on the left side, and June 12 on the right side, by the Carden method. Primary union resulted and patient was discharged July 26.

Patient presented himself for re-examination April 10, 1904, and I found a peculiar deformity of both thighs, inasmuch as both were rotated inward to an arc of 90 degrees. Linear scars on both amputation stumps; no pressure could be exerted on the end of the stump, on account of extreme tenderness, though it must be admitted that pain was not present.

In this case surely the function was anything but good; pressure upon the end of the stump was not born properly.

On the other hand, I may go one step further and review also the indications for this operation. I know of no disease where a Carden operation would be absolutely indicated, more particularly in view of the fact that we are in the possession of an amputation method at the knee-joint which gives the very best functional result, and which withal is safer, simpler, and consumes less time for its execution. The operation I refer to is a pure and simple exarticulation, without interfering in any way or manner with the articular surface of the femur. I have had occasion to operate but one case in this manner and I can assert without the slightest hesitation that both the primary and ultimate results were simply perfect.

Case X.—P. L., thirty-nine years of age, was

admitted to the hospital May 20, 1903, with a progressing gangrene of the foot due to arteriosclerosis. May 22 a typical exarticulation at the knee joint was performed; primary union resulted and patient was discharged cured June 4.

Contrasting the two cases just related, and for reason which will become more apparent in the course of my paper, I believe I am entitled to formulate my opinion as regards these two amputations in so far that the Carden as such should be abandoned, and in its place there should be substituted the simpler, safer and better exarticulation. (It is only proper to mention here, that the functionally perfect Gritti and Ssabanejeef operations will be discussed later.)

Another well-recognized and universally adopted method of amputation, which can be brought up to refute the theory that amputations performed through broad epiphyses are always followed by good functional results, is the Syme's amputation. As is well known, in the original Syme operation the section of the bones is carried through tibia and fibula at a level slightly higher than the cartilage covering the tibia; later modifications leave in site the cartilage covering the tibia, and saw off the two malleoli only; and good results have been claimed for this amputation. Personally, I have had no experience whatsoever with either the original Syme operation or with its later modifications, but through the courtesy of the firm of A. A. Marks, manufacturers of artificial prothesis, I have had occasion to examine a number of Syme stumps, and I have invariably found marked tenderness present. On this account and also on purely theoretical grounds I cannot agree with the views given, and instead I have devised a new amputation in the region of the ankle joint, based on a different principle, which at least in the case tried (Case VIII) has given me a perfect result; an account of it has appeared in the May, 1904, number of the *Annals of Surgery*.

In refutation of the theory of epiphyseal amputations we can also bring up the well-known Pirogoff amputation. This, as is universally conceded, forms an excellent stump, and yet its distal end formed as it is only by the posterior extremity of the os calcis, is no broader than the diaphysis of the tibia or femur. These various examples are, I believe, sufficient to prove that the theory of epiphyseal amputations is not tenable.

Another amputation which was well known, in fact so well known that it has received the rather flattering name of "amputation at the seat of election," is the one in the upper third of the leg. This amputation was particularly preferred prior to the present perfection of artificial prothesis, because the stump was bent at the knee, and the anterior surface of the tuberosities of the tibia was fitted into the socket of the artificial pegleg. In view of the fact that the stump, so bent, could very well stand the pressure of the pegleg, and never gave rise to any trouble, the theory was propounded that the stump in order to give perfect function, must be covered by skin designed by

nature to pressure, and which must be in original connection with the underlying periosteum and bone. This no doubt also served as the underlying principle upon which Ssabanejeef designed his ideal and perfect amputation at the knee-joint.

But let us investigate a stump formed at the so-called seat of election; it is soon seen that the end of the stump, which after all is the point to look at, does not enter into function at all, as it is situated some distance behind the point of support; as a matter of fact this end of the stump in ninety-nine out of a hundred cases is absolutely poor, and will not stand the slightest amount of pressure; and the ability to wear with a certain amount of comfort an artificial pegleg in these cases does not depend in the least upon the stump. It is seen therefore that this theory also is untenable.

Just a word here regarding the functionally excellent Gritti amputation, as in it there are present all the conditions which are required to correspond with the theory above stated, viz., the skin covering the end of the stump is that normally covering the patella, is designed by nature to pressure, and furthermore is still in connection with the underlying periosteum and bone. It is true that this stump is perfect, but personally I believe and know that the good function of this stump depends wholly upon the patella, and I also believe that the function of the Gritti stump would be just as good if the skin covering the patella were all destroyed, and in its place, integument from the lateral or posterior surfaces would be utilized for covering the stump. The perfect function of the Gritti stump cannot be denied, but in view of the fact that an exarticulation at the knee joint is just as perfect, simpler and quicker, it is questionable whether we shall find many indications for its performance; perhaps it should be reserved for those comparatively rare cases only in which the patella is healthy, but the articular surfaces of the femoral condyles are diseased.

For a while considerable stress was laid upon the periosteum covering the bone, and numerous methods were, and for that matter still are, in vogue, which laid particular stress upon the preservation and subsequent suture of a cuff of periosteum. In spite of numerous assertions to the contrary, I have personally never seen any permanent benefit to arise from such a procedure, as, peculiar as it may appear, the periosteum so sewn over the end of a sawn surface does not form new bone, as one might be inclined to expect. I have frequently had occasion to examine stumps formed in this manner at secondary operations and with the Roentgen rays as well, but I have never seen any new formation of bone.

Let us now go backward a few years, say 1897, and ask once more, what was the state of our knowledge regarding the good function and painlessness in general of amputation stumps? We can sum up our knowledge in brief in the following: absence of pain and good function was present only (1) in all typical exarticulations, (2)

in the Pirogoff amputation, (3) in the Gritti amputation, (4) in the Ssabanejeef amputation, and (5) in the Scymanowsky amputation. This was the state of affairs when Bier began his studies upon this very important point, and the question therefore was only to find out the one common thing, the presence or absence of which is to decide the good or bad function of the stump. As a result of his studies and experiments Bier (Sammlung klinischer Vorträge No. 264) arrived correctly at the conclusion that "in none of these amputations does the bone expose a wounded surface," and in consequence he has been enabled to propound an entirely new theory regarding the good function of amputation stumps, viz., "that in no case must the bone expose on its distal extremity a wounded surface; and in order to obtain this result, it is necessary to cover or seal the wounded surface with bone covered by its periosteum, or if this be impossible, it is preferable to exarticulate."

This was the fundamental principle laid down by Bier for all amputations, and to carry it out he devised the now well recognized method, which is known as the osteoplastic amputation. This is not the place to discuss the method in detail, as it has been done so frequently that it would be merely needless repetition. The underlying principle is to form, either from the bone amputated or from a neighboring bone, a thin osteoperiosteal flap, which obtains its mobility from a hinge of periosteum; this osteoperiosteal flap is brought into correct apposition with the sawn surface of the amputated bone, and its periosteum is sutured to the opposed periosteum and to other convenient structures. If the work is done under aseptic conditions primary union usually results, and when this is the case, it has been my experience that the final outcome is perfect in every instance.

Just one word more regarding the indications for this operation; as a general rule it might be said, that it is indicated in every amputation, in the upper extremity as well as in the lower, with the exception of the following two, first, in all those cases in which the general condition of the patient demands a hasty termination of the operation, and second, in those cases in which the nutrition of the parts (diabetes, syphilis, etc.) is so poor that there is danger of necrosis of the osteoplastic flap.

In discussing the question of indication it will not be devoid of interest to critically examine my cases in this respect; both the primary and ultimate results must be accounted for. If this is done it will be seen that one case (Case III) died, that in two cases (Cases II and V) the osteoperiosteal flap had to be removed, in the remaining cases both the primary and ultimate results were ideal. In the case with the fatal outcome, death, as already stated, was due to insolation, and this occurrence could have happened just as well after a simple amputation, or any other operation; certainly blame for its occurrence cannot be attached to the particular method of operation performed.

The osteoperiosteal flap had to be removed in two cases. In Case II a Pirogoff amputation was performed at the express request of the patient for a low amputation; owing to the poor vitality of the tissues, due to an extreme endarteritis, the bone flap necrosed and had to be removed; but this is no fault of the method, an error of judgment occurred, as only an amputation at a higher level should have been attempted. In Case V a slight marginal necrosis of the bone flap took place; in due time the involved portion would have exfoliated, in no way marring the ultimate result; owing to advanced metastases it was deemed best to hasten the closure of the sinus by removing the flap.

I am firmly convinced that the osteoplastic method of amputation forms one of the greatest advances of modern surgery; and I believe it to be worthy of more extended trial than has been heretofore vouchsafed to it.

NEED OF MORE ACCURATE KNOWLEDGE IN THE DIAGNOSIS AND TREATMENT OF CHRONIC SUPPURATIVE OTITIS MEDIA.^{1,2}

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THE subject of chronic aural suppuration has been suggested to the writer by the number of cases seen each year, in which the diagnosis and treatment have been matters of indifference, and in many cases the possible significance of the symptom entirely overlooked.

The importance of this condition and the early application of appropriate treatment should be fully appreciated by every practising physician. In spite of the many articles and discussions upon the subject, there are physicians who fail to appreciate the importance of aural discharge, and allow children entrusted to their care to suffer irreparable damage to an organ of inestimable value from an educational, as well as from a sociological and economical standpoint. How often, I am sorry to say, do we hear the advice given that it is nothing but a "running ear," wash it out once in a while and the child will outgrow it? *The number of cases in which the disease outgrows the patient will never be known, for I venture the opinion that many die from intracranial complications in which the chronic suppurative middle-ear disease is never recognized as a causal factor.*

Many physicians regard chronic otorrhea much too lightly, and frequently consider it a mere inconvenience, instead of giving it the proper consideration as a serious condition, from which grave complications may arise at any time.

It must be admitted that there are many cases of chronic aural discharge which pass a long life without suffering any apparent inconvenience, ex-

¹ Read before the Medical Society of the State of New York, January 27, 1904.

² Received for publication May 6, 1904.

cept from the presence of the discharge, and die from some intercurrent disease. These cases occur in every physician's practice.

On the other hand, we must not lose sight of the fact that this disease progresses insidiously, destroying the delicate structures of the middle ear, invading the bony walls, impairing their nutrition, subsequently ending in caries or necrosis. An extension to the mastoid, antrum or cells may take place, and finally a serious invasion of the intracranial contents may occur. There is no good reason to suppose that one case will pass through life without further trouble, while another, with practically the same local conditions, will develop serious complications. Until we are able to separate these cases, I contend it is the duty of every physician to bear in mind the grave consequences that follow a neglect of this condition.

It is unfortunate that these vast and destructive changes often take place without pain, and that the gravity of the affection is not always commensurate with the symptoms. When pain does supervene upon a chronic discharge it is of great significance; it is nature calling out for relief, and warning us of disastrous results likely to follow if the warning is unheeded. For a physician to stand by and wait for the catastrophe of which he has been forewarned is little short of criminal negligence. At the outset every case of chronic suppuration of the middle ear intrusted to our care should receive a most careful examination of the nose and nasopharynx to determine their condition and the possible influence of obstructive lesions in these localities. All such obstructions are now well recognized factors in the persistence of chronic ear discharge, and as influencing a recurrence. They should be removed when found to exist in either locality.

It seems almost superfluous for me to add that adenoid growths of the pharynx is a most common and fruitful cause of aural suppuration. Nevertheless, there are still physicians who will not, or at least do not, appreciate the importance of this relation, and utterly fail in the treatment of these cases by lack of a thorough investigation and recognition of the possible causal factors. It is sometimes remarkable what rapid improvement will take place in a persistent and intractable discharge by attention to this most important part of the treatment. This is especially noticeable in children and young adults.

The next important step in the investigation is to determine the location of the perforation and extent of destruction of the membrana tympani, and whether or not thorough drainage is taking place. Chronic suppurative disease in this cavity, when dependent upon insufficient drainage, should be treated on general surgical principles, the same as it would be in any other cavity of the body; that is, by free incision and removal of any obstruction so as to allow thorough drainage and promote healing. Where is there a general surgeon or gynecologist who would treat an insuffi-

ciently drained pelvic abscess discharging into the vagina by simply ordering a cleansing vaginal wash, and that without investigation to determine the source or cause of the trouble, subjecting his patient to the number of serious consequences that may follow? I venture to say there is not one who would be guilty of such lax methods in the treatment of so important a condition. There are, I am sorry to say, numberless cases of chronic aural discharge treated in just this manner; the extent and cause of the local condition not having been investigated by the attending surgeon, putting the entire responsibility upon nature and trusting to good luck that the patient may escape subsequent complications. To some this may seem overdrawn, but to those working in this field their experience, I am sure, will substantiate it as a true picture.

When we come to consider the prognosis in these cases we realize how important it is to know what structures of the middle ear are involved and the extent of such involvement. At our first examination we should ascertain the location of the perforation, if caries of the ossicles or adjacent structures exist, if polypoid degeneration is present within the tympanum, if there are cholesteatomatous changes, and, finally, if the process is limited in its destruction to the middle ear. It behooves not only every aurist, but the general practitioner as well, to appreciate the importance and significance of this knowledge as bearing upon the care and proper management of chronic ear discharge. A perforation situated high up in the drum usually signifies necrosis of the ossicles, or involvement of the attic structures and less tendency to kindly healing. Necrosis or polyps when present must be removed, and granulation tissue destroyed before palpable results can be expected. Cholesteatomatous complication or an extension of the process beyond the confines of the drum cavity, indicate a much more serious condition and call for radical interference, as these patients are drifting beyond the border line of safety into the field of meningeal complications. I ask, then, is it reasonable to suppose that chronic middle-ear suppuration can be treated intelligently without such knowledge?

Every thinking physician knows that to treat these cases empirically is not in accord with the present advanced knowledge of the pathology of disease. To persist in these lax methods is to close our eyes to the light of medical and surgical advancement, and to result detrimentally to the patients entrusted to our care. The treatment of any disease must be based upon the broad and fundamental principles of pathological anatomy. These principles, as applied to the disease in question, are of paramount importance on account of the intimate anatomical relation of the middle ear to many vital structures. When the profession as a whole begins to realize that aural suppuration means more than the mere presence of a discharge, and that patients suffering from this condition are prone to many and serious complica-

tions—then, and not until then, will chronic suppurative otitis media be treated with a full appreciation of its possible gravity.

In this paper there is no claim made to originality; it is merely the presentation of a few facts concerning the diagnosis and treatment of a disease which in many instances have been neglected, and a plea to the profession in general to attach to this disease its proper significance, and not look upon it as a condition unworthy of a most careful examination and investigation into the cause and extent of the trouble, a procedure which will manifestly give a more rational basis for treatment. It is only by keeping these facts constantly in mind and dealing with every case accordingly that we can expect a cure of a chronic otorrhea. We would be sorry to be understood as advocating radical surgical measures in every case of chronic otorrhea; but we do insist that every case should receive its appropriate treatment according to the pathological condition present, and all physicians under whose care these cases come should obtain this knowledge before attempting treatment.

The writer has purposely omitted the question of prophylaxis, for, although a very important and interesting phase of the subject, to deal with it would carry us far beyond the limits of this paper.

DEDUCTIONS.

1. Chronic otorrhea is not given the importance that its gravity demands.
2. In all cases the treatment should be based upon the pathological condition present.
3. In addition to proper attention to the nose and nasopharynx and all minor surgical procedures, appropriate treatment to the middle ear will yield good results in a large percentage of cases.
4. Where caries is limited to the ossicular chain and there are no contra-indications, ossiculectomy should be the operation of selection.
5. Cases presenting symptoms of extension beyond the tympanic cavity should be subjected to the radical operation.

INTESTINAL OBSTRUCTION FOLLOWING APPENDICITIS OPERATIONS. REPORT OF EIGHTY-SIX CASES.

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THE literature on the subject of appendicitis has reached enormous proportions, and on first sight it would seem that all has been said which could be said without needless repetition. One aspect of the subject, however, has not been sufficiently emphasized. It is the disastrous number of sequelæ which may result from an appendicitis which has gone on to the formation of an abscess, either within or outside of the appendix. A partial list of those most frequently occurring is as follows: Lymphangitis, lymphadenitis, especially of the mesenteric and retroperitoneal glands;

venous thrombosis of the right or left iliac and portal veins, Douglas' and tubo-ovarian abscesses, psoas abscess, lumbar abscess, perinephritic abscess, subphrenic abscess, septic hepatitis, hepatic abscess, septic cholangitis, septic cholecystitis, septic pneumonia, abscess of the lung, empyema, pancreatitis, septic ulcer of the stomach with hematemeses, fecal fistula, intestinal adhesions, bands and obstructions, post-operative hernias, ureteral obstruction, pyemia, inflammation of the parotid gland, ischio-rectal abscesses, rupture of abscesses into cecum, colon, rectum, or bladder, secondary hemorrhage from the artery of the appendix, circumflex iliac artery, or iliac vein, acetone-mia, etc.

Surgeons thoroughly appreciate the dangers of waiting before operating in cases of appendicitis, and their zeal in the matter of early operation has often been wrongly attributed by their medical confrères to operative enthusiasm. Evidence, however, is rapidly accumulating to convince the most incredulous that their position is a most sound one, based on both clinical and pathological findings. In this list of sequelæ, perhaps no single one is more to be dreaded than intestinal obstruction. This condition is the result chiefly of the delay for what is commonly known as "walling off," which means the waiting for the abscess to be surrounded by adherent intestines. No one can tell when these adhesions may produce intestinal obstruction, and surely in any disease we must take into account just as much the remote results as the immediate ones. We may also say without fear of contradiction that there has been a time in every fatal case of appendicitis when an operation would have saved the patient.

In a study of 1,000 operations for acute intestinal obstruction and gangrenous hernia made by Dr. Charles L. Gibson (*Annals of Surgery*, Vol. 32, Nos. 4 and 5), he found "bands" to be the cause of obstruction in 186 cases, this being the commonest form of acute obstruction in the adult. "These were most frequently from inflammatory remains of appendiceal troubles and from the female pelvic organs. While the subject for simplicity's sake is treated under the heading of bands, it must be borne in mind that many of these are in the form of diffuse, velamentous adhesions, causing obstruction by kinking and knotting of the intestines, as well as by direct diminution of the caliber of the intestine, and strangulation of the blood-supply."

Fifty-eight per cent. of these 186 cases were in males; and the site of the obstruction was the small intestine in eighty-six per cent. of all the cases.

In taking up this subject, I shall first report in *extenso* two of my own cases, one of which had two post-operative attacks of intestinal obstruction successfully operated upon, the second case having eighteen inches of gangrenous intestine. Following this are all the cases which I have been able to find in the literature on the subject. In addition, there will be found a number of unpublished cases, occurring in the practices of various

surgeons who have been kind enough to allow me to publish them. Lastly, there will be found a general discussion of this vital and interesting topic.

E. L., female, single, Russian, cigarmaker; admitted to the Presbyterian Hospital, September 11, 1903, with the following history: Family and previous history negative in every respect. Present trouble began two days prior to her admission, when she was suddenly seized with sharp pain in the epigastrium, accompanied with vomiting. The next day this pain localized itself in the right iliac fossa, where it became exceedingly tender. Vomiting continued occasionally with nausea until admission. Bowels moved normally. On admission, temperature was $101\frac{1}{4}^{\circ}$ F.; pulse, 120; respiration, 32. Patient is pale, anemic. Whole abdomen is tender and somewhat distended, and moves but slightly with respiration. Tenderness most marked in right iliac fossa, where there is very great muscular rigidity, which makes the detection of a possible underlying mass impossible, although it was supposed to exist.

Immediate Operation (gas and ether being employed).—Intermuscular incision with blunt separation of the muscles in the direction of their fibers. Appendix found retrocecal, surrounded by a pocket containing about two ounces of thick pus, swollen to the size of one's thumb, and intensely congested. The base of the appendix was gangrenous with a perforation about half an inch from its insertion into the cecum. Double ligature of plain catgut applied to its base, which was cauterized after amputation of the organ. No irrigation used. Two small drains of gauze, wound about with rubber tissue, were passed down to the appendix site. Remainder of wound closed with catgut in layers. Time, thirty minutes. Condition postoperative, good. After the operation all the symptoms became ameliorated. Temperature and pulse gradually lowered. On September 18, eight days after operation, highest temperature 101.5° F.; pulse, 85.

On the ninth day, the temperature suddenly dropped from 101° to 97° F., and the pulse became 100. Patient complained of cramp-like abdominal pains and began to vomit. On the tenth day symptoms referable to the abdomen were better until the night of the second day of her pain, when her condition became more serious. At midnight the temperature was 96° F.; pulse, 120. The vomiting was frequent and very foul, abdomen distended, but not at all tender. Numerous high enemata failed to bring away any fecal material or gas. Early in the morning of the third day, the eleventh day after the first operation, the vomiting became fecal, entirely unrelieved by lavages, and there had been no bowel movement. The abdomen was more distended, with slight general tenderness. Vigorous peristaltic sounds could be heard all over the abdomen with the stethoscope, and there was almost no muscular rigidity. From the lack of rigidity and marked tenderness, and the presence of vigorous peristalsis, it was evident at once that we had to deal

with a mechanical obstruction, and not an inflammatory one. The pulse was poor and 130.

Operation, September 21, 1903, 10 A.M. (gas and ether).—Median incision above the pubis. Much distended small intestines presented. Pads inserted, drawing the intestines over toward the left iliac fossa, so as to give a clear view of the appendix region, where it was surmised the trouble lay, and so it turned out to be; for it was seen at once that the two extremities of a single coil of small intestines were adherent to the abdominal wall in immediate juxtaposition to each other. The portion of the coil distal to the adhesion had become twisted upon itself, completely obstructing its lumen; for the portion of the intestine leading up to the point of adherence was ballooned to the size of one's arm, while the coil leading away from the adhesion was completely collapsed. As soon as the twist was undone, the gas passed on rapidly into the collapsed intestine. One extremity of the twisted coil was loosened from its adhesion to the abdominal wall, and an area on its surface, denuded thereby of its serous coat, was closed in by a Lambert suture of fine silk. The other extremity could not be loosened on account of the firmness of the adhesions, so it was left as it was. Patient in bad condition, requiring an intravenous infusion of salt solution. Rapid closure of the abdomen by silkworm-gut sutures passed through all the layers. Five dejections followed the operation the same day without any artificial assistance. Vomiting ceased a few hours after the operation. Pulse the next day 100 and the patient very comfortable, the temperature being 100° F. No distention.

The subsequent course was uneventful until the midnight of October 6, 1903, being the twenty-fifth day after the first operation, and the fifteenth day following the second one. She then began to vomit large amounts of undigested food. Vomiting continued the next day, unrelieved by repeated lavage. Enemata failed to evacuate gas or fecal matter. During the day the abdominal signs developed exactly as they had in the previous attack of obstruction.

Operation, twenty hours after the onset, October 7, 10 P.M.—Previous median wound reopened without cutting. Distended small intestine presented. A less distended loop was followed down in the direction of increasing distention and resistance until a point was reached where the coil was tightly adherent to a neighboring loop. This had produced a kink in the afferent loop, causing absolute occlusion of its lumen. Beyond this adhesion, the intestine was collapsed. The adhesion between the loops was separated, leaving a raw area on each loop the size of a quarter of a dollar. Gas passed immediately onward into the collapsed bowel. The raw areas on each loop were covered in with interrupted Lambert sutures of silk. No further raw areas were discovered after search. Relief was almost immediate after the operation. She vomited twice very foul material. There were three stools in the course of the following fifteen hours, and all pain ceased. Complete con-

valence followed without a setback. The patient left the hospital on November 8, 1903, fifty-eight days after the first operation, forty-eight days after the second one, and thirty-two days after the third operation. On December 26, 1903, the patient was seen, and said she was in the best of health and had no digestive disturbances, bowels constipated. She was instructed to return immediately to the hospital on the appearance of any symptoms of obstruction.

The second case is as follows: Mrs. N. C., aged twenty-eight years; admitted to the Presbyterian Hospital, October 3, 1903, 11 P.M., with the following history: Three years ago operation in Philadelphia for appendicitis, two rubber tubes being left in as drains. Never any other serious illness. Seven weeks previous to admission, miscarriage, for which curettage was performed. Convalescence uneventful.

Three days before admission patient was seized with severe burning pain in abdomen, which was not localized but general. It was often very colicky. Later it seemed to be most intense in the lower median part of the abdomen, where it became very tender to the touch. Prostration soon became marked. She vomited constantly, and for four days there had been no movement of the bowels nor passage of flatus. Examination elicited the following points: Hippocratic facies marked, tongue dry, foul, coated with brown fur. Odor of breath foul. Temperature, 104.8° F.; pulse, 140, poor quality but regular. Heart and lungs normal. Abdomen distended and moved scarcely at all with respiration. Over the appendix region is a four-inch scar, evidently the result of a suppurating wound. Great tenderness over whole of lower half of abdomen, most marked in right quadrant, where there seemed to be a soft, semi-elastic mass, the size of a grapefruit, very indefinite in its outlines but extending over to and beyond the median line, and down behind the pubis. There was a tympanic note over the whole of the abdomen, and over the mass. Very faint peristalsis heard over the abdomen with stethoscope. Vaginal examination elicited in the right fornix a tender, soft, rather elastic, indefinite mass bulging down behind the uterus. Profuse leucorrheal discharge. There was evidently peritonitis present with intestinal obstruction, the etiology of which could not be determined. It was thought possibly to be due to an appendix abscess which had ruptured, but the more probable diagnosis was ruptured pyosalpinx.

Operation, October 3, 1903, 1 A.M. (gas and ether being used).—Three-inch median incision above the symphysis. Free, foul-smelling purulent fluid escaped on opening the peritoneal cavity. Omentum adherent to uterus and tubes. On separating this, a coil of distended, blackish, small intestine presented, the two extremities of the coil leading over to the appendix scar, where they were adherent to each other and to the anterior parietes. About one and a half inches from the adherent point the coils had twisted about each other, producing an evident obstruction not only

to the passage of the intestinal contents, but also to the vascular circulation; for, on attempting to lift up the gangrenous intestine, this broke away from its mesenteric attachment, practically of its own weight, and throughout the whole extent of the gangrenous area. There was no perforation anywhere, and the gut was distended. It lay almost wholly in the pelvis, the walls of which were covered with a foul exudate, in places necrotic. Resection of the gangrenous gut was performed as quickly as possible with a medium-sized Murphy button, and without the escape of any of the intestinal contents. Measurement of the part excised showed it to be eighteen inches long. The excess of mesentery was reefed with catgut. Peritoneal cavity irrigated thoroughly with profuse quantities of hot saline solution. No trace of the appendix was seen at any time of the operation. Two large cigarette drains left in the lower angle of the wound, which was hastily closed with silkworm-gut sutures, passed through all the layers of the abdomen by means of a handle needle. Patient in bad condition, making necessary a saline intravenous infusion of 1,500 c.c. at a temperature of 110° F. on the operating table.

Patient's condition remained grave after the operation, responding very slightly to all forms of stimulation. In the first twenty-four hours three hypodermoclyses of 1,000 c.c. of saline solution were given. There were also in this time four dejections as the result of turpentine enemata. Repeated lavage allayed the vomiting. Temperature next day was 105.5° F.; pulse, 140 and weak. Nutrient, stimulating enemata given. Patient died on the fourth day after the operation of progressive rapid sepsis, due to the purulent condition of the pelvic walls.

The following case occurred in the service of Dr. F. Tilden Brown, to whose kindness I am indebted for the privilege of recording it.

P. M., female, aged twenty-nine years; clerk. Four or five attacks of slight appendicitis. Admitted to hospital seventeen hours after beginning of present attack, on June 21, 1903, with a temperature of 101° F.; pulse of 90. Abdomen rigid all over, but this very marked in the right iliac fossa, where there was exquisite tenderness, but no mass. Intermuscular operation was at once performed. The appendix was intensely inflamed, and there was an ounce or two of pus about it. It was removed, and two small cigarette drains were left down to the stump, the wound being largely closed. Convalescence was smooth until the twentieth day, in the morning, when she was allowed out of bed for the first time. In the afternoon of that day, July 11, she complained of considerable pain in the abdomen, and vomited that evening and night several times. The next day the vomiting continued, and in the evening became fecal. No movement could be obtained by enemata and she became distended.

Operation at Midnight, July 12, 1903, two days after the onset of the first symptom (gas and ether).—Vertical incision through the right rec-

tus, whose muscular fibers were bluntly separated at the level of the navel. Serous fluid escaped from the peritoneal cavity, and there were many adhesions in the neighborhood of the cecum. A band of omentum was traced through the peritoneum and found attached to the muscles in the old wound. The intestines had evidently looped over this so that a volvulus had formed. The band was cut and the twist reduced, air passing immediately into the collapsed portion of intestine. Closed in layers, a small drain being left in the lower angle. Patient had a good bowel movement the next day, and all her symptoms subsided. She went home August 15, 1903, fifty-five days after the first operation, and thirty-three days after the second one.

We may divide the cases of obstruction occurring after an operation for appendicitis into three classes: 1. Immediate. 2. Early. 3. Late obstruction. The first class, immediate obstruction, comprises those cases in which obstruction comes on immediately after the operation, from a few hours to a couple of days. The operation is in many cases never quite recovered from before the symptoms of obstruction gradually present themselves. The obstruction here is usually due to intestinal paresis alone, caused by a local or general peritonitis; this paresis, however, may be accentuated by the effect of adhesions. Rarely at this time do we get the mechanical effect alone of adhesions. In some cases before the primary operation the arrest of the passage of the fecal material and of gas may project so prominently in the foreground that the erroneous diagnosis of intestinal obstruction alone may be made, and the appendicitis be overlooked.

The second class, "early" obstruction, is that occurring a number of days or weeks after the primary operation, before the convalescence from this is complete, usually before the complete healing of the wound. It may be due to two main causes: (a) The development of secondary abscesses in remote portions of the abdomen; the actual pressure of such an abscess may of itself produce obstruction, or the adhesions about such an abscess may produce angulation of the gut sufficient to obstruct its lumen. The simple opening of such an abscess has often resulted in the immediate subsidence of the obstructive symptoms. (b) The second cause in this class, and the more frequent, is that due to mechanical obstruction, produced by adherent loops causing constricting bands about each other, or resulting in angulation, volvulus, internal hernia, etc. It is not a question of present peritonitis.

The third main class, "late" obstruction, may come on weeks, months, or years after the primary operation, or even after an antecedent appendicitis, which has not been operated upon. During this period there may be perfect health without digestive disturbance of any kind, or there may be more or less stomach difficulty, and attacks of constipation. The causes of obstruction in this class are the same as under (b) in the second class.

The symptoms of immediate obstruction, arising as they do within a few hours or a couple of days after the primary operation, are often puzzling, for our treatment will depend on whether it be produced by paralytic ileus, due to peritonitis, either local or general, or to a mechanical obstruction, hence the importance of a correct diagnosis. In paralytic ileus we are apt to hear much decreased, or no peristalsis over the abdomen with the stethoscope; in mechanical obstruction it is strong and colicky. In the former we may get a history of the passage of some gas; in the latter the obstruction is complete. In the former, pain may not be great; in the latter it is violent and colicky, and not localized. Collapse comes on early in the latter, and is severer. Vomiting is not so apt to be stercoraceous in paralytic ileus and it is apt to be less projectile, less frequent, and less intractable. Muscular rigidity is much more pronounced and general in peritonitis than in mechanical obstruction. In the former the symptoms of progressive sepsis are more in evidence than in the latter.

The diagnosis between these two conditions, peritonitis or obstruction, is fraught with the greatest difficulty in the majority of cases, and is the cause of much anxiety to the surgeon. It is unquestionably true that many cases of mechanical obstruction have died unrecognized under the name of peritonitis. When in doubt, wait for a time the result of medicinal measures, i.e., wash out the stomach with warm salt solution, putting in through the tube one drachm each of Rochelle and Epsom salts, which dose should be administered every hour until a result is obtained or a diagnosis is reached, employ high enemata containing olive oil and turpentine, or a solution of alum, which is often very efficacious, and give two or three hypodermics of atropine gr. $\frac{1}{100}$ at intervals of two hours. Atropine is given with the idea that it increases peristalsis and contracts blood-vessels, but it is useless, of course, if strangulation exists. Gentle abdominal massage may also be used. If these measures are not quickly followed by the passage of flatus or feces, and the possibility of mechanical obstruction still exists, operation had better be performed at once.

It must not be forgotten that mechanical obstruction and intestinal paresis (peritonitis) may coexist at the same time.

Operation being decided upon in immediate obstruction, what procedure is best? The mortality of these secondary operations, following closely a primary one, is frightfully high, due to the patient's prostrated condition. The quickest procedure, therefore, is urgently called for. A secondary abscess at a distance from the appendix site would call for an incision over its location. Barring this complication, we may reopen the wound, or make a median incision below the navel. Is the patient in a low condition, then the former procedure may offer the greatest hope. A loop of distended small intestine presenting in the wound is incised. If our opening be above the site of the obstruction, then the quantity of gas

and feces evacuated will be large, and can be increased by pressure on the abdomen, while neighboring coils of small intestine will collapse. In case our opening be below the obstruction, then we shall have to make another puncture in another loop. This procedure may likewise help in ileus depending on peritonitis alone.

In case the patient is in better condition, it may be wiser to quickly make a median incision in order to more thoroughly search for the obstruction. Evisceration may not be practised on account of increasing the shock. Peritonitis requires copious flushing of the abdomen with hot normal salt solution. Bands, etc., require appropriate treatment, while we may at times have to content ourselves with making an artificial anus, particularly in cases with general, extensive adhesions. Speed is a *sine qua non*.

2. "Early" obstruction as a rule presents little difficulty in diagnosis. The patient is convalescent from the original appendicitis operation and on regular diet, when there is a sudden attack of sharp, colicky, abdominal pain, with vomiting which is intractable, soon becoming stercoraceous. This colic is often due to error in diet, causing acute attack of indigestion. Obstruction of the bowels is complete, no flatus even being passed. The abdomen is not tender, nor is there much muscular rigidity, and this is true likewise when later the intestines beneath become distended. Rigidity only is present when peritonitis comes on. No tumor is palpable. Peristalsis is violent above the obstruction, and is heard loudly with the stethoscope. Shock is a prominent symptom, and the patient's condition becomes alarming, pulse rapid and weak, face very drawn and anxious, cold perspiration. The temperature drops to subnormal. The symptoms also may be subacute, due to the more gradual contraction of adhesions, or they may be coincident with the development of a secondary abscess at or far from the appendix site.

After a possible initial cathartic, no more should be given by mouth. Massage here is often very efficacious, because the adhesions are soft and yielding. High enemata, etc., should be tried, but as soon as a diagnosis is made, no time should be lost before proceeding to an operation, without waiting for the subsidence of the shock, which latter may never occur. A median incision is in order. A distended loop of intestine is sought for, and followed in the direction of increasing distention and resistance, until the obstructing cause is discovered, and appropriate treatment applied. Practically the small intestine is the one always obstructed, and the seat of the difficulty will be found in the right iliac fossa in the great majority of the cases. Secondary abscesses may be found buried deep in a mass of adherent intestines, necessitating drainage. Kinks are untwisted and angulations straightened, etc. Raw areas resulting from the separation of adhesions are buried under Lembert sutures, or covered with Cargile membrane. Gangrenous areas in the intestine resulting from volvulus, in-

ternal hernias, etc., are excised, and the ends either left in the wound, or brought together with a Murphy button. The abdomen is closed with the cavity full of salt solution, which may prevent the re-formation of some few adhesions. If the whole extent of the intestines is a great mass of inextricably agglutinated intestines, our only resort is to make an artificial anus.

Two measures besides high enemata, etc., may be employed to ward off an impending attack of mechanical obstruction, if used very early. One is vigorous abdominal massage. It is a very valuable procedure, and certainly has not received the attention it merits. The second is change in position of the patient, not only from side to side, but also particularly by elevation of the hips—this may straighten out a beginning flexure, and may change the direction of the peristalsis so that it will not impinge on a fixed point (Morris).

3. "Late" obstruction, as we have seen, may occur years after an appendix operation, so long previous that its connection with the present attack may not be thought of. It may occur also a long time after an appendicitis which has not been operated upon, for surely the adhesions may occur just the same without an operation as with one. This latter fact needs decided emphasis. The symptoms may be acute or chronic in character. The acute attack comes on without a premonition in a perfectly healthy person, either without any appreciable exciting cause, or after violent exercise, or a heavy, indigestible meal. It begins as a violent colic which yields to no treatment. Peristalsis is exaggerated, but ineffectual, as no gas nor feces are passed. Vomiting comes on at once and is persistent, sooner or later becoming fecal in character. Temperature remains normal for some time (may be subnormal from shock) until peritonitic inflammation arises. Shock is often a pronounced symptom, and the pulse gradually rises and becomes weak. The abdomen progressively distends. There is but slight muscular rigidity until peritonitis comes on. Palliative measures, such as enemata and massage, are less efficacious because the adhesions are firm and well organized.

The diagnosis soon becomes clear, and no time should be lost before operating. A median incision should be made below the navel and the obstruction relieved by adopting measures appropriate to the conditions found.

The chronic type of "late" obstruction has a more gradual and progressive course. Following the original appendicitis, whether operated upon or not, there may be a period of longer or shorter duration of perfect health, or the patient may complain of digestive disturbances, particularly from the side of the bowel activity. Constipation becomes more and more marked, relieved with greater and greater difficulty by cathartics and enemata. There may be slight attacks of intestinal colic with nausea. A diagnosis may be made at this stage, and that much to the patient's advantage. It would seem at this stage in some cases that abdominal massage and electricity

might avail to ward off complete obstruction. Careful watching of a patient with a history of appendicitis and with the above symptoms will enable the right diagnosis to be made. Oftener, however, that of intestinal indigestion is made, and the patient is plied with drugs, and put upon a rigid diet, with the result of causing loss of flesh and strength often of extreme degree. Chronic obstruction is caused by the gradual contraction of adhesions between two loops of bowel, or about a loop, or the gradual or periodic forcing of a coil beneath a band, etc., resulting in a progressive diminution in the caliber of the bowel. Persistence of these symptoms urgently requires operative interference. Sudden complete obstruction may come on at any time without obvious cause, or determined by an over-hearty meal or violent exercise. The symptoms then of acute complete obstruction are in full evidence, requiring active operative treatment.

Kocher, in the article cited later, lays down the following propositions: 1. The chief danger in each case of ileus rests upon the disturbances in circulation in the bowel-wall and its consequences, namely, venous hyperemia leading to hemorrhages and infarcts, edematous infiltration and the collecting of decomposing fluids in the intestine, injury and exfoliation of the epithelium and the consequent permeability of the bowel-wall for the passage of ferments, toxic substances, and bacteria.

2. This permeability leads, on the one hand, to general intoxication and infection, and, on the other, to local inflammation of the bowel-walls, necrosis of the same with ulcerations, perforation, and peritonitis.

3. The circulatory disturbances in the intestinal walls are caused by pressure from without upon circumscribed portions of the wall, and also by pressure upon the mesenteric vessels, due to strangulation by bands, internal hernias, volvuli, invaginations, etc.

4. Not less dangerous circulatory disturbances are caused by pressure from within, resulting from the stagnation of the intestinal contents, increased transudation and secretion above the obstruction, and the consequent overstretching of the bowel-wall.

5. In every case of ileus the immediate removal of the circulatory disturbances of the bowel-wall is indicated. This is accomplished, not only by removal of the extra-intestinal pressure, but also by doing away with the intra-intestinal stretching—the first can only be accomplished by means of a laparotomy,¹ the second without such a procedure, as by the formation of an artificial anus.

6. The slow development and chronic course of an ileus in no way restricts the absolute validity of the aforesaid indication, since the severest forms of ileus begin slowly, and the chronic forms may suddenly become acute.

7. The operative treatment of each case of ileus should be considered from the first moment. The

non-operative treatment is suitable simply for those cases of obturation and dynamic ileus in which a strangulation ileus can surely be excluded.

8. The removal of the obstruction to the intestinal contents is desirable, but the removal of the circulatory disturbances in the bowel-wall is an absolute necessity of any operative procedure. Since the first indication in all forms of ileus is adequately met by a laparotomy, this is to be preferred in all forms in the beginning stages. In the late stages of obturation and paralytic ileus, the palliative operation (artificial anus) is indicated.

9. The previously bad prognosis of the operative treatment of ileus is exclusively caused by the too long delay in the carrying out of the operation, resulting in the gangrene of the wall, due to extra-intestinal pressure, or intra-intestinal stretching from increasing decomposition of the bowel-contents.

10. On account of the frequent uncertainty of the diagnosis in the early stages, a satisfactory recovery can only be expected by means of the radical operative treatment of every patient in whom there is a well-founded suspicion that a mechanical obstruction exists.

We may divide the cases with reference to the previous operation as follows:

1. Those in which the ileus occurs at the site of the previous operation.

2. Those in which the ileus occurs independent of the site of the previous operation, or afar from it, and only being indirectly due to it.

3. Ileus where no lesion can be found, i.e., paralytic ileus.

Tavel, in a very elaborate and instructive series of articles (*Revue de Chirurgie*, October, November, December, 1903) on ileus in general, with particular reference to the diagnosis of the seat of the occlusion, gives the following symptoms of occlusion in the various regions of the intestinal canal:

1. *Pyloric Occlusion*.—The vomiting contains food with mucus sometimes mixed with blood, but without bile. The vomiting is no more in amount than is swallowed. There may be a few infrequent stools, and there is some passage of flatus. Pain is located in epigastrium and back. Resistance in pyloric region. Distention is local, limited to the outlines of the stomach, and does not fill up the whole epigastric region, as in duodenal occlusion.

2. *Duodenal Occlusion*.—Vomiting of food with or without bile and pancreatic juice. It is extremely abundant, and the patient rejects much more than is swallowed. From the stomach with the tube large amounts of bile and pancreatic juice can be obtained. The passage of feces and gas are infrequent, or completely absent. General meteorism of the epigastric region. Retraction of the subumbilical region.

3. *Ileo-jejunal Occlusion*.—Vomiting at first is mucus with food, mixed with bile, then consists of the contents of the upper part of the small intestine, becoming later fecaloid. Stools and gas

¹ By this Kocher evidently means the thorough searching for the cause itself of the obstruction.

almost totally absent. Distention is pronounced occupying the middle portion of the abdomen, the course of the colon being less distended or flat.

4. *Ileo-caecal Occlusion.*—Vomiting more infrequent, and coming on later than in the previous variety and is fecal. Stools and flatus entirely absent. Distention the same as in the previous form and without pushing up of the liver or thoracic organs. Tenderness localized in the ileo-caecal region, and, in most of the cases, tenderness of the right pelvic wall by rectal or vaginal examination.

5. *Occlusion at the Hepatic Flexure.*—Vomiting appears late, and is fecal; can entirely fail. Stool and flatus absent. Distention pronounced, particularly of the ascending colon, with pressing upward of the liver and diaphragm. Tenderness marked in the region of the hepatic flexure. High enemata well retained. Tumor may be present.

6. *Occlusion at the Splenic Flexure.*—Vomiting much later, may be wanting. No passage of gas or feces. Distention very marked, particularly of the transverse and ascending colon, producing pressure upward of the diaphragm. Tenderness most marked in the left hypochondrium. High enemata not so well retained. Tumor may be present.

7. *Obstruction at the Sigmoid.*—Vomiting very late or absent. No stool or gas passed. Meteorism very pronounced. Whole colon distended. Pushing upward of the liver and heart, resulting at times in the disappearance of the dullness of these organs. No high enemata possible. Low ones fairly retained. If obstruction be situated in the iliac part of the sigmoid, abdominal palpation may elicit it, in the pelvic portion rectal or vaginal examination may be necessary to determine it.

8. In colon obstruction as distinguished from ileo-caecal, the large size of the tumor which may be present is to be noted, both palpable and percussible, and sometimes visible in its contour through the abdominal walls. In addition it is to be remarked that in the purely mechanical period there is usually no vomiting. This comes on when peritonitis sets in, *i.e.*, in the terminal stage. There are two methods which may help in the diagnosis of the seat of the occlusion when in the colon: 1. Insufflation of the colon with air producing tympanitic note and metallic tone in those points where it did not exist before. 2. Method of Treves of introducing water into the colon and progressively percussing the point of advancement of the fluid which will be arrested at the seat of obstruction.

(To be Continued.)

Urotropin in Scarlet Fever.—Urotropin is recommended highly as a preventive of nephritis in scarlet fever by D. BUTTERSACK (*Deutsch. Arch. f. klin. med.* Vol. 80, Nos. 3 and 4). If given in doses of 0.05 to 0.5 grams three times daily or twice as much of the citric acid compound, the drug is absolutely harmless, even where some renal irritation is already present. If not given throughout the entire course, it should be administered with the appearance of the first trace of albumin.

ASEPTIC CATHETERIZATION OF THE URINARY PASSAGES.¹

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AND

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IN treating the subject of aseptic catheterization we must consider the sterilization of catheters, the preparation of the urinary canal, and the introduction of the instruments in an aseptic manner.

As metal catheters can easily be rendered aseptic by boiling, nothing further will be said of them. More difficult is the sterilization of flexible catheters, the majority of those in use being made either of soft or hard rubber, caoutchouc, or woven cotton and silk.

The literature of the last ten years is replete with publications of experimental work on the sterilization and preservation of these instruments. Aside from boiling, most of the methods recommended by various authors require expensive and complicated apparatus, which are not available to the average practitioner and out of the question for patient's use. We therefore conducted our experiments with the view of finding the simplest method of sterilization with the least impairment to the instrument. During our work we found that instruments infected with colon or mixed cultures from an infected bladder were more difficult to sterilize. It was also noticed that if the instruments were allowed to dry a day or two, a longer time was necessary for sterilization. We will here give briefly a few of our experiments with these instruments.

(A) SOFT RUBBER CATHETERS.

1. Catheter infected with colon; boiled three minutes; growth.

2. Catheter infected with colon; boiled five minutes; no growth.

3. Catheter passed into infected urethra and dried twenty-four hours; cut into three pieces: (a) Washed in soap and water; boiled three minutes; sparse growth. (b) Unwashed; boiled three minutes; growth. (c) Control; growth.

4. Retention catheter that had been in an infected bladder twelve hours; dried twenty-four hours; cut into four pieces: (a) Washed; boiled five minutes; no growth. (b) Unwashed; boiled five minutes; no growth. (c) Ends clamped so that boiling water could not enter the lumen; boiled five minutes; growth.

5. Catheter infected with colon; washed; exposed to formalin fumes thirty minutes; no growth.

6. Catheter infected with mixed culture; washed; exposed to formalin fumes thirty minutes; no growth.

7. Infected retention catheter; cut into two pieces: (a) washed; dried; exposed to formalin fumes thirty minutes; no growth. (b) Un-

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washed; dried; formalin fumes thirty minutes; growth.

The apparatus used for sterilization with formalin consisted of a long glass jar, the open end of which was closed by a hollow metal stopper surrounded by rubber; the bottom consisted of a thin piece of copper. A formalin pastil was placed in the stopper and gentle heat applied (110 degrees to 115 degrees F.) for about fifteen minutes, or until the tablet was entirely disintegrated.

8. Infected retention-catheter; placed in Kutner's sterilizer three minutes; growth.

9. Catheter infected with colon; Kutner five minutes; growth.

10. Mixed infection; Kutner ten minutes; no growth.

The Kutner apparatus consists of a metal chamber surrounded by a water-jacket, in which steam is generated. The steam passes to the top of the apparatus, from which catheters are hung, then through the lumen of the catheters into the central chamber.

11. Catheter infected with mixed culture; washed and immersed in bichloride solution, 1:500, for fifteen minutes; growth.

12. Same as No. 11: (a) Thirty minutes; no growth. (b) Unwashed; thirty minutes; no growth.

13. Catheter infected with mixed culture; washed thoroughly in soap-spirits and running water; immersed in soap-spirits for fifteen minutes; growth.

(B) SILK-WOVEN AND HARD-RUBBER CATHETERS.

We repeated the same experiments as outlined under (A), and obtained practically the same results as regards sterilization.

(C) URETER-CATHETERS.

1. Catheter infected with colon; boiled three minutes in water; growth.

2. Infected with colon; boiled five minutes; growth.

3. Infected with colon; washed; formalin fumes fifteen minutes; growth.

4. Infected with mixed culture; soaked in five per cent. carbolic solution thirty minutes; growth.

5. Infected with colon; Kutner five minutes; growth.

6. Mixed infection; boiled in ammonium-sulphate solution four minutes; growth.

7. The same experiment as in No. 6; boiled five minutes; no growth.

We also experimented with various solutions of bichloride of mercury, carbolic acid and hydrochloric acid, etc., but found them unsatisfactory and unreliable for sterilization purposes.

Some of the methods, although safe as regards sterilization, cannot be employed because they proved to be too destructive to the instruments. Soft-rubber catheters stood boiling in plain water for five minutes for six successive days, and then became rather too soft for further use. Much

better results in regard to their durability were obtained by boiling in a concentrated sodium-chloride solution. Silk- and cotton-woven catheters after one boiling in plain water showed blisters and small cracks in the varnish coating. They also became too soft for further use. While soft-rubber catheters did not do well in a saturated solution of ammonium-sulphate, we found that the cotton- and silk-woven, as well as the hard-rubber instruments, survived longer if boiled in that solution than in any other. They will stand, as we found, ten successive boilings of five minutes each, if put in the boiler thoroughly wrapped in gauze or a towel.

If several instruments have to be sterilized at the same time, they must be wrapped in a towel in such a manner that the surface of each instrument is entirely covered by part of the towel and does not come in contact with the neighboring catheters, or the sides of the boiler. In wrapping ureter-catheters into a towel, particular care must be taken that no part of the same ureter-catheter comes in contact with another part.

After boiling in the ammonium-sulphate the catheters must be thoroughly rinsed in sterile water to free them from the crystals of ammonium sulphate.

Steam sterilization, either by the autoclave or Kutner apparatus, is as injurious to flexible instruments as boiling. Although varnished instruments do not crack or blister so readily, after three of four steamings they generally become too soft for further use.

Sterilization by formalin is the least destructive, but as only the surface of the instrument is sterilized the utmost care must be taken that it is thoroughly washed and dried before being exposed to the fumes. Catheters of small caliber, as ureteral instruments, soon become clogged up by deposits within the lumen. The length of time needed for sterilization (at least half an hour), and the fact that the whole process of sterilization must be constantly watched, are serious obstacles to the use of formalin by the busy practitioner.

As the cystoscope is a means of ureter catheterization, we next experimented with its sterilization, which we found a more difficult task. The cystoscope cannot be boiled, for, as Casper points out, the prism lies in a metal casing, surrounded by cement. The connection between metal and glass does not permit of heating, as the expansibility of these materials is different. Besides the material used for cementing, the prism possesses a different expansibility, so that the prism will become loosened by frequent boiling and water may enter. The reflecting surfaces of the prism also suffer from heating, and the lenses become more or less opaque from moisture being deposited as soon as the instrument begins to cool off.

In a recent publication Casper describes the

following method for sterilizing cystoscopes: The non-removable parts of the instrument are rubbed for three minutes vigorously, especial attention being paid to the crevices and edges about the lamp and prism. The instrument is then snugly wrapped in gauze previously soaked in soap-spirits, in which it remains until ready for use. The removable metal parts are boiled five minutes. We experimented with this method in the following way:

1. Cystoscope infected with mixed culture and dried twenty-four hours; rubbed three minutes with separate pieces of cotton soaked in soap-spirits; washed in sterile water and plunged in bullion tube; growth.

Soap-spirits are made according to the following formula: Thirty parts alcohol, 17 parts H_2O , 7 parts KO, 6 parts olive oil (Gerson).

2. Same as in experiment number 1, except it was rubbed for five minutes; growth. Soap-spirits made according to formula of Hebra.

3. Same as in experiment number 1; growth. Soap-spirits made according to the formula of German pharmacopœa, which contains two parts of a high-grade oil-soap, two parts of rose-water and three parts of alcohol. It can easily be prepared by the physician himself and used in large quantities, as it is inexpensive.

4. After rubbing the instrument with soap-spirits for four minutes, it was wrapped in gauze soaked in soap-spirits, and allowed to remain twenty-four hours; growth.

5. Cystoscope infected with a mixed culture and dried twenty-four hours; washed in soap-spirits and warm water; rubbed with soap-spirits two minutes, then with alcohol for one minute; washed in sterile water and plunged in bullion; no growth.

6. Proceeded in the same way as in experiment 5, and then wrapped in gauze previously soaked in soap-spirits, in which it was allowed to remain four days; washed in sterile water; no growth.

The best results with the soap-spirits method were obtained if the gauze or towel used in wrapping the instrument was closely woven. If sterilized catheters, cystoscopes, etc., are snugly wrapped in closely woven towels, we are able to keep them in a sterile condition for quite a number of days (at least five days). The soap-spirits on drying forms an air-tight covering around the instrument by filling the meshes of the towel with soap. We lay stress on the fact that soap-spirits after the formula of the German pharmacopœa is to be used for soaking the gauze or towel, as soap-spirits prepared in other ways do not form the essential impermeable covering.

Cystoscopes can also be sterilized with formalin-gas without injury if the temperature in the chamber in which they are to be sterilized is not raised above 110 degrees or 115 degrees F. For this purpose we constructed an apparatus in the following way: A glass tube an inch and

a half in diameter and about fourteen inches long is fitted with two stoppers. The one at the top consists of a cork with a perforation which allows the passage of the instrument as far as the ocular. The lower one consists of a hollow metal chamber surrounded by rubber, the bottom of which consists of a thin piece of copper. The formalin-powder or tablet is placed in the metal chamber and gentle heat applied. Here as in the sterilization of the catheters the instrument must be washed in soap and water and dried before exposing it to the formalin. Here are the results of some of our experiments with this apparatus.

7. Cystoscope infected with mixed culture and dried twenty-four hours; placed in formalin-chamber and gentle heat applied for fifteen minutes; washed in sterile water; plunged in bullion; growth.

8. Same as in experiment 7, but allowed to remain thirty minutes; growth.

9. Cystoscope infected with mixed culture and dried twenty-four hours; washed in soap-spirits and water and dried; placed in formalin-chamber and gentle heat applied for twenty minutes, and then kept in the apparatus ten more minutes; washed in sterile water; plunged in bullion; no growth.

Although the formalin method seems to possess a higher degree of safety as regards sterilization, still its application for general use will be marred for the same reasons stated above, requiring too much time and constant watching during the process of sterilization. We are therefore pleased to be able to recommend, from our work, the method as described in experiment 5 as the simplest and at the same time a safe procedure for sterilizing cystoscopes.

As to the question of keeping catheters, cystoscopes, etc., aseptic after sterilization, we found that the many devices, tubes, jars, designed for keeping catheters sterile, in the majority of which this is accomplished by means of a formalin pastil, unsafe. In order to keep instruments sterile for a reasonable length of time we recommend wrapping them tightly in a closely woven sterile towel, wet with soap-spirits made according to the German pharmacopœa.

As regards the introduction of instruments in an aseptic manner, it is a well-known fact that even the healthy urethra harbors various organisms, but it is doubtful if they are capable of infecting the mucous membrane of the bladder. Before introducing an instrument the meatus should be carefully sponged off with alcohol or a sublimate solution. Although it is impossible to free the urethra of micro-organisms, many authorities recommend, as a matter of precaution, the flushing of the urethra with sterile water or a solution of boric acid before instrumentation.

Another point is the choice of a lubricating agent. Oil can be sterilized by boiling, but this is a slow and dangerous procedure and the oil

soon becomes rancid. It cannot be used for lubricating cystoscopes as it blurs the optic; the same is true of vaseline. Both oil and vaseline form a tenacious coating on the instrument which cannot be easily removed in future sterilization, and, according to Casper, favors the lodging of infecting bacteria on the surface of the instrument. For this reason patients should be especially warned against the use of these lubricants.

Of late years we have used glycerin almost exclusively, the sterilization of which is unsatisfactory. Its great disadvantage, though, is that it is not a good lubricant and of no value where catheterization is difficult. More satisfactory is a combination of glycerin, tragacanth and water as originally recommended by Guyon and Kraus. Casper added cyanide of mercury to this combination in order to make it antiseptic. Culture tests made by him with this lubricant containing cyanide of mercury in a strength of 1:500 proved it to be antiseptic. The formula is tragacanth, 3.0; aq. destil., 100.0; glycerin purissim, 20.0; hyd. oxycyana, 0.246. Our experiments concur with those of Casper. It can be used for lubricating cystoscopes, as it dissolves readily in the bladder fluid, and therefore does not blur the optic. It is a good lubricant and is non-irritating. Being semi-solid, it can be kept in collapsible tubes, which facilitates its use. Care must be taken in its preparation, however, as some of the first tubes we obtained were very unsatisfactory.

In conclusion, we will briefly summarize those methods of sterilization which have proved to be safe and simple:

a. Soft-rubber catheters are rendered sterile by being boiled five minutes, preferably in sodium-chloride solution, care being taken that the solution fills the lumen of the catheter. As a matter of precaution the catheter should be washed with soap-spirits and running water after use.

b. Hard-rubber and silk- and cotton-woven catheters should be boiled five minutes in a saturated solution of sulphate of ammonia. Each instrument should be wrapped separately in gauze or a towel, or if several catheters are to be sterilized, in such a manner that their surfaces shall not come in contact with the sides of the vessel or other catheters.

c. Ureter-catheters can be folded and wrapped in a towel so that their surfaces are kept apart, and boiled for five minutes in a saturated solution of ammonium sulphate.

d. Cystoscopes should be sterilized by first washing them in soap-spirits and water, then vigorously rubbing them for two minutes with two different pieces of gauze or cotton, wet with soap-spirits, and then with alcohol for one minute. The channel for the ureter-catheter can be cleansed out by means of a brush, such as those used for cleansing pipes, first brushing with soap-spirits, then with alcohol.

e. Instruments can be kept aseptic if they are snugly wrapped in a piece of gauze or towel wet with soap-spirits.

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VALUABLE SUGGESTIONS FROM THE INSPECTION OF URINE.¹

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IN the ordinary routine examination of the urine there are several preliminary factors meriting consideration. First the sample to be examined should be liberal and not a scant dram or so. Then it is essential that the specimen inspected should not represent any particular renal effort; nor should it serve as an index of vesical health for any definite period of the day. The sample studied should come from the mixed total urine for twenty-four hours. This is most important in order to draw accurate conclusions from chemical analyses, for twenty-four hour quantities serve as bases of urinary calculations. The specimens should be examined as soon as possible. To avoid change from fermentation or bacterial activity, it is advisable to place about one dram of chloroform or toluol in the container.

To regard a sample of urine wholly isolated from the individual voiding it is an error. The quantity for a child ten years old is not equal to that passed by a man of thirty years. The reddish albuminous urine of a menstruating woman gives no cause for alarm. The profuse watery urine of low specific gravity, passed by a festive alcoholic might agitate one to the extent of thinking of diabetes insipidus.

It is well to have in mind the approximate nature and amount of solid and fluid ingesta, medicines; likewise the age, sex and degree of bodily activity. The general condition of skin and lungs is often very suggestive in consideration of the amount of urine excreted, particularly during extremes of seasons. Climatic influences are manifest in inverse ratio between the excretory action of the kidneys and the lungs and skin.

What can be learned from mere inspection of urine? The eye can grasp in a moment such

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details as quantity, clearness, color, foam, sediment. Odor is frequently very suggestive. Reaction is often indicative. Considering these factors as individual premises, it is our desire to revert to the conclusions they suggest. Here it should be stated that *mere inspection does not obviate the necessity of careful chemical and microscopical examination.* Inspection does, however, suggest to the busy practitioner features calling for verification; and frequently saves a valuable minute or so for other work.

Normal amounts of urine, 900 c.c. to 1,200 c.c. (females), 1,200 c.c. to 1,500 c.c. (males) offer nothing definite to the mind, though rather giving presumption of renal sufficiency and of disease, if any, being cystic. Increased quantity immediately places in the foreground two conditions with three others in the background. Very large amounts, 7,500 c.c. to 10,000 c.c., almost invariably are due to diabetes insipidus, while 2,500 c.c. to 5,000 c.c. point more toward diabetes mellitus. The rare condition of amyloid kidneys is suggested, although it seldom yields more than 3,500 c.c. Contracted kidney usually offers 2,000 c.c. to 3,000 c.c. Frequently a slight increase, as 1,500 c.c. to 2,000 c.c., is the mark of a worried chlorotic woman or a student around the nerve-racking examination time. Decrease in excretion is the general rule of all fevers, with the most marked example in tuberculosis meningitis. Ascitic conditions, particularly cirrhosis of the liver, as would be expected, yield scanty urine. The condition, par excellence, pictured by diminished renal excretion to the point of anuria is acute nephritis. Marked decrease in quantity always demands most careful investigation. Congested kidney seldom offers less than 500 c.c. to 800 c.c.

A study of the color of urine *requires* the total excretion for twenty-four hours. Color varies largely with the amount of water excreted, and this has its diurnal variations. The contrast between the clear, sparkling, colorless urine of diabetes insipidus and the dark-hued, scanty urine of acute nephritis emphasizes this relation. Tea, coffee, hard work, mental fatigue, serve to vary the amount of fluid excreted and influence the color, as does, indeed, digestion itself, or potation. Variations in yellow color depend in part on urobilin. Brownish hues suggest increase of urea urates, uro-erythrin, as marked in the urines of fevers and puerperium. It must be remembered that urines darken on standing—this being especially noticeable in phthisis. The average, normal color is bright yellow or pale lemon.

Halliburton, by a table of doubtful general value, sought to classify urines by color with relation to cause. Medicaments and foods may yield characteristic alterations, as the deep yellow of rhubarb, golden yellow of santonin, orange of chrysophanic acid, blue of methylene blue, brownish black of tar, carbolic acid, etc.

The principal changes of yellow from saffron to dark olive green or mahogany brown are due to bile. Occasionally after standing for a short time exposed to the air a grass green color may

appear, owing to oxidation and formation of biliverdin.

Bluish cast or dirty greenish color may be due to indican. Rarely a specimen may not show this color until oxidation has been aided by exposure to the air. Variations from a smoky hue in acid urines to deep red in alkaline suggest hematuria or hemoglobinuria, which should be investigated chemically and microscopically. A slight pinkish color points frequently to nephritis, especially if noted during the course of an infectious disease. Intermittent occurrence of reddish colors may result from malarial hematuria or rupture of varicose veins at the neck of the bladder. Inspection of hemorrhagic urine gives valuable information as to the probable source of the blood—as will be considered below.

Very rarely is the dark brown of melanemia encountered. Lipuria and chyluria present a creamy urine. Diabetes mellitus exhibits in most instances a pale greenish or light yellowish green.

Foam ordinarily forms and disappears rapidly. If it remains for some time it suggests albumin or sugar. If the foam is colored yellow bile is present, though rarely a strong urobilinuria may cause a similar appearance. If the foam is blue methylene blue or very strong indicanuria is the likely cause.

The common odor of urine, described as "not disagreeable" and aromatic, may be changed to the ammoniacal odor of decomposition, as in cystitis, with retention. Fecal odor may lead to the suspicion of a fistula high up along the genito-urinary tract. The sweetish odor of diabetic urine at times gives way to the danger-signal—sweet apple smell of acetone. Some foods give a characteristic odor, as asparagus. Medicines likewise leave olfactory traces, and all are not as pleasant or aromatic as the balsams or the violet scent of turpentine.

Clearness of urine, as a rule, exists for a very brief period after voiding. The nubecula of mucus, phosphates, urethral and vesical epithelia soon forms. This little cloud is said to be more marked in the urines of females because of the vaginal epithelium.

The sparkling clearness of diabetic urine is no less important than the slimy turbidity of cystitis. Turbidity may be due to urates or flocculent phosphates, in which case a simple chemical test of heat and nitric acid will clarify the urine. Pyuria gives a variable degree of turbidity. In mild cases pus appears more as a general opacity of the urine. The pus settles in inverse proportion to the amount of mucus contained in the specimen. Opacity in red and brownish urines suggests blood. If the blood is well mixed, the kidneys are the probable source. If large clots are present, the bladder is the most likely seat of trouble. If small wormlike blood casts are present the probable origin of the hemorrhage lies in the ureter or pelvis of kidneys.

Mucus present in unusual amounts causes a viscosity, especially noticeable on attempting to pour the urine. If mucous shreds, commas, etc.,

are present, the diagnosis of gonorrhea is all but made. The microscope readily determines with exactness the nature of the disease. The large, irregular, fibrinous shreds suggest superficial vesical erosions.

Portions of tumors may be present, but whether papilloma, myxoma, or more malignant growth can be told only by the microscope. Seminal fluid frequently appears as the source of turbidity and is taken for phosphates until a drop of acid fails to dissipate it and the lens tells the tale. Chyluria and lipuria give a creamy appearance and on standing the fatty molecules rise to the surface, forming a pellicle.

The red, sandy, gritty crystals of uric acid are commonly present in uricacidemia and are readily told at a glance. Oxaluria may be confusing until the lens reveals the highly refractile "letter envelope" crystals of calcium oxalate. Tomatoes, rhubarb, apples, oranges and many other fruits and vegetables may be the cause of needless alarm. Bacterial turbidity is diffuse, not very intense, of finely granular appearance. The microscope alone can determine it.

The general appearance of the urine often tells an approximate specific gravity. As a general rule, the darker the color, the higher the specific gravity, for amounts of urine under 1,500 c.c. In larger quantities of pale urines, if the foam disappear readily, the specific gravity is probably low; if the foam persist, specific gravity is very likely to be high.

The reaction may be judged to a degree from the color, clearness and odor. "Smoky" urine is acid. Bloody urine of a pinkish hue is alkaline. Marked turbidity with viscosity is indicative of alkaline, as is the ammoniacal odor of decomposition. Precipitation of phosphates with turbidity also bespeaks alkalinity. The presence of uric acid crystals in fresh urine makes acidity a certainty.

Thus without the use of heat, chemical, or instrument, the urine aids in determining its own pathology. The inspection is in no way determinative, but merely suggestive. Mere inspection does not do away with the necessity of careful chemical and microscopical analysis. It simply serves to direct the attention of the busy practitioner to prominent features which require further investigation. If inspection can save time without sacrificing carefulness, if it can suggest without confusing, it deserves some slight consideration from those who speak with scorn of the "sunlight test."

140 West One Hundred and Fourth Street.

Site for Orange Hospital.—A deal has just been closed by which the Rev. F. Victor Romanelli, rector of the Church of Our Lady of Mount Carmel, of Orange, N. J., has secured the handsome house and estate of the late Samuel F. Jayne for the site of the new Catholic Hospital at Orange. Father Romanelli bought property containing three large dwellings adjoining the Jayne estate last spring. Both will be utilized as the site for the hospital. The main entrance will be through Centre street.

QUANTITATIVE ALBUMIN DETERMINATIONS.¹

BY KARL M. VOGEL, M.D.,
OF NEW YORK.

In spite of the fact that the importance of the subject has stimulated the investigators of several generations to endeavor to produce some easily applicable, rapid method for the quantitative determination of the albumin in the urine, their efforts have thus far been fruitless. The number of reliable qualitative tests, which can be quickly carried out, is quite large, but the only quantitative procedure, which is entitled to consideration where accuracy is required, is the tedious and complicated method of drying and weighing the precipitate obtained on coagulating the albumin by heat.

Of the methods applicable to routine clinical work, those of Esbach and Purdy have perhaps the greatest claim to convenience and ease of execution. The errors attending the use of the Esbach tube are too well known to require comment, and in addition a delay of twenty-four hours is necessitated before the result can be obtained. The centrifugalization method of Purdy is also open to criticism on the score of variations in the density of the deposit due to differences in the specific gravities of the urines tested, and owing to the technical difficulties of ensuring an absolutely uniform speed of the centrifuge at exactly the prescribed rate of 1,500 revolutions per minute during the required length of time.

The convenience of volumetric methods has naturally led to efforts to introduce them into this field also. Tanret,¹ Boedecker² and Venturoli³ years ago devised analytical schemes of this sort, but they have been discarded as untrustworthy. Sahli⁴ has lately proposed a volumetric method in which the albumin is precipitated by heat, filtered off, and redissolved in a known amount of alkali and its amount determined by titrating with an acid, using Congo red as indicator, but he himself expresses doubts as to the reliability of the figures obtained in all cases.

The simplest and most promising of the volumetric procedures is that published by Wasiliew in the *St. Petersburg med. Wochenschrift*, No. 37, 1896. The author's description of the method has been reproduced, but without comments as to its reliability, in various publications, and Ditman, about a year ago, called attention to the possible availability of the method. The present study was undertaken as a continuation of his determinations, in order to establish the accuracy of the results to be obtained by this plan.

The method consists in the precipitation of the albumin by a 25 per cent. solution of sulphosalicylic acid, using an aniline dye known as echtgelb as an indicator, and then multiplying by an empirical factor to obtain the amount of albumin. It was found possible to simplify somewhat the technic of the process without in any way in-

¹ Received for publication May 18, 1904.

validating its principles. The sulphosalicylic acid solution, which, of course, should be as accurately standardized as possible, can quickly be prepared by making it of such a strength that it exactly neutralizes two c.c. of a N_1 KOH solution, using phenolphthalein as an indicator. When made in this way, Wassiliew's factor, which consists of five decimals, may be reduced to the fraction .01, and if ten c.c. of urine be taken for the test, the percentage of albumin is obtained directly by noting the number of c.c. of sulphosalicylic acid required to produce the end reaction, and then moving the decimal point one place to the left.

The end reaction is by no means an easy one to determine, especially if the quantity of the indicator, two gts., recommended by Wassiliew, is employed. It was found that the use of ten to twelve drops produced a much sharper end reaction without any apparent decrease of sensitiveness, the reaction being, if anything, more delicate with the larger amount.

The most advantageous technic was found to be as follows: Several portions of ten c.c. each of the urine measured with a pipette were placed in flat evaporating dishes of about seven cm. diameter. If necessary the urine was acidified with acetic acid, a frankly acid fluid appearing to give the sharpest end reaction. The same number of drops of indicator was added to each portion and the reagent then very slowly run in from a burette with constant stirring, as the union of the acid and albumin appears to take place somewhat slowly. The first portion tested was taken as a control, and after the end reaction had been reached, as denoted by the production of a red color, which did not appear to be deepened by the addition of a further drop of the reagent, a slight excess was run in. The titration was then carried out on the other portions in dishes of the same nature and under the same conditions of acidity and quantity of indicator as the first, the end reaction being reached as soon as the same shade of color as the control was obtained. Carried out under these precautions titrations on several portions correspond very closely.

In order to control the results obtained a number of gravimetric determinations of each urine were made and accurate averages thus secured. Six specimens of urine were used and each was also tested volumetrically, after dilution to one-half and to one-quarter with normal urine, thus making eighteen different albumin contents. It was found that the volumetric method gave fairly accurate results for urines containing more than .15 to .2 per cent. of albumin (the highest strength of urines tested was .27 per cent.), but that below this limit the percentage of error was so inconstant and high as to deprive the method of all claims to accuracy.

An important source of error appears to be the fact that even in normal urines a certain amount of sulphosalicylic acid must be added before the end reaction is obtained and as this is not a constant quality it would seem to be an

irremediable defect of the method. It may be remarked in passing that the control determinations on which Wassiliew based the procedure were made by precipitating the albumin of the urine with alcohol, a method that has been found very unreliable.

The following table showing some of the averages obtained will serve to indicate the general character of the results yielded by the method:

No. of Specimen.	Amt. of Albumin in 100 c.c. Gravimetric Method.	Concentration of Urine.	Amt. of Albumin in 100 c.c. Titration Method.
I.	.245	Undiluted	.245
		Dil. to $\frac{1}{2}$.104
		Dil. to $\frac{1}{4}$.140
II.	.137	Undiluted	.133
		Dil. to $\frac{1}{2}$.121
		Dil. to $\frac{1}{4}$.120
III.	.222	Undiluted	.224
		Dil. to $\frac{1}{2}$.130
		Dil. to $\frac{1}{4}$.122

Since the above study was begun, two authors, Spaeth¹ and Gerard², have mentioned the method in their volumes on urinalysis just published. Spaeth condemns it utterly, and Gerard ranks it with the roughly approximate methods.

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MEDICAL PROGRESS.

MEDICINE.

Optic Neuritis in Paratyphoid.—Ever since the paratyphoid bacillus has been discovered, attempts have been made to distinguish clinically between paratyphoid and typhoid. The symptoms are, however, so much alike, that the differentiation has more scientific than practical importance, except that a more favorable prognosis can be given in paratyphoid. The development of an optic neuritis in a case of the latter disease in the practice of G. FLATAU (*Munch. med. Woch.*, July 12, 1904), prove that even the rarer symptoms of typhoid may occur here.

Vincent's Angina.—Two varieties of bacteria have been found by A. UFFENHEIMER (*Munch. med. Woch.*, July 5, 1904) in the secretion of Vincent's angina, fusiform bacilli and spirilla. The former are not motile and are decolorized by Gram if abundant alcohol is used, while the latter are very motile and absolutely Gram negative. Both are occasionally found in cases suffering from other affections. The disagreeable fetor characteristic of Vincent's angina is probably caused by the spirillum. All attempts to grow the latter on artificial media have failed, but the *Bacillus fusiformis* could be cultivated for four or five generations on sterilized saliva, though it was impossible to obtain a pure culture, owing to the fact that all solid media were unsuited. Attempts at inoculating animals were all negative and when a small amount of the secretion was rubbed into the tonsil of a normal individual, no inflammation occurred.

Congenital Hypertrophy and Dilatation of the Colon.—Hypertrophy and dilatation of the large intes-

tine (Hirschsprung's disease) in the majority of cases is a congenital disease and the patients rarely reach an advanced age, since gastro-intestinal disturbances develop only too readily during the first year of life, owing to excessive putrefaction in the stagnant feces. If the patients survive the first years, the intestinal musculature may accommodate itself to the wide lumen and there may be no further trouble except that intercurrent attacks may endanger life. The majority of patients are males who suffer from a most obstinate constipation and perhaps never have a movement without the use of an enema. Inflammatory processes in the intestines are common owing to the irritation of impacted feces and much blood and mucus may be voided. At the same time the tympanites may reach marked degrees and the patients may be a menace to themselves and their surroundings by the frequent discharge of extremely fetid gas. From time to time there may be attacks of obstruction with complete cessation of peristalsis. Objectively the enormously distended loops are clearly visible through the emaciated parietes and gurgling may be very audible. In children the growth of the rest of the body is retarded, and the thorax eventually becomes deformed. L. KREDEL (*Zeitsch. f. klin. Med.*, Vol. 53) reports a few cases of his own, and dwells at length on one where laparotomy was performed for supposed obstruction. There was no impediment to the passage of feces but a loop of colon was firmly caught in the pelvis. The only interference consisted in freeing this loop, but the patient improved wonderfully and no longer suffered from attacks of obstruction. In most cases, however, an operation is not indicated, except to clear the diagnosis or to correct a kink, etc., which may be the cause of an obstruction. The daily use of very large enemata of water or oil is indicated in most instances. A colostomy may be in place when the attacks of obstruction frequently repeat themselves or where an ulcerative colitis has developed, but great care should be exercised, since there is a tendency for the sutures to tear out owing to the great weight of the colon.

Embolic Gangrene After Pneumonia.—One of the least common complications of pneumonia is embolism of the systemic vessels. The patient of L. KREDEL (*Zeitsch. f. klin. Med.*, Vol. 53) suffered from a typically severe lobar pneumonia and was convalescing when two days after the crisis a sudden intense pain was felt in the leg and the limb soon became blue and cold. Two weeks later an amputation became necessary in the lower third of the thigh. Probably the embolus came from a thrombus which had formed in the left ventricle, since the patient had presented irregular heart action and a systolic murmur during the course of his pneumonia.

Essential Albuminuria.—C. POSNER (*Zeitsch. f. klin. Med.*, Vol. 53) thinks it is a mistake to diagnose a nephritis in every case where traces of albumin are excreted. With delicate tests albumin may be detected in almost every urine, but larger quantities often occur in the so-called essential albuminuria and merely signify that the renal filter has become less dense without, however, altering the appearance or function to such an extent that a nephritis may be assumed. If the histories of such cases be studied in detail, an infectious disease will often be discovered as cause, but even after years the amount, appearance and specific gravity of the urine will remain normal and casts are uncommon or absent altogether. The treatment consists in proper diet and mode of living, since the kidneys undoubtedly form a *locus minoris resistentiae*, and a nephritis may follow after the use of much alcohol, etc.

Changes in Corpuscles of the Blood in Puerperal Fever.—Examination of the blood in cases of puerperal sepsis has led Profs. POROCKI and LACASSE (*Ann. de*

Gyn. et d'Obst., June, 1904) to the following conclusions as to its value for diagnosis and treatment; a certain amount of information can be elicited which will aid in the prognosis of a case; at least we can distinguish certain grave forms. Even if there be a high leucocyte count with a marked increase of the polynuclear forms, the prognosis remains favorable if the eosinophiles do not disappear. Where there is present a phlegmasia alba dolens, even in spite of the leucocytosis (30,000) or the polynuclear increase (90 to 95 per cent.) there may be a diminution of the eosinophiles. In the severe cases which recover, the eosinophiles increase as the polynuclears decrease in percentage. If the leucocytes go above 25,000 to 30,000 and the polynuclears are between 80 and 90 per cent. the prognosis should be guarded, especially if the increase is accompanied by the diminution in the eosinophiles.

Relation of Appendix to Pelvic Disease.—All operators are agreed that whenever the abdomen is opened for other abdominal or pelvic disease, the appendix should be examined and removed if diseased. The fact that a number of appendices thought to be normal at the time of operation proved subsequently to necessitate a second operation, led R. PETERSON (*Am. Jour. Obstet.*, July, 1904) to study two hundred appendices, grossly and microscopically, removed in cases operated upon for distinct gynecological lesions. These were classified in six groups, as follows: Negative, 32.5 per cent.; chronic inflammation, 28.5 per cent.; doubtful significance, 20.5 per cent.; former inflammation, 14 per cent.; acute inflammation, 3 per cent.; peri-appendical inflammation, 1.5 per cent., this last class including two cases of tuberculosis and one of primary carcinoma of the appendix. The social condition of the patient had practically no bearing on the relation of the appendix to pelvic disease. In 8 per cent. of the cases fecal concretions were found macroscopically, their presence did not necessarily indicate that the appendix was diseased. In cases with chronic disease of the appendages 41.5 per cent. showed diseased appendices. Uterine fibromata were present in 26 of the 200 cases, in 50 per cent. the appendices were normal. In 24 cases of ovarian cystomata 70.9 per cent. of the accompanying appendices were diseased, a proportion larger than with fibroids. It was further concluded from the study of these cases that only about 50 per cent. of appendices removed during operations for pelvic lesions are normal; that the average length of the appendix is between 8 to 9 cm., the maximum length being found between the ages of twenty and thirty years; that menstrual pain may be due or enhanced by an inflamed appendix; that the shape of the appendix, the presence of adhesions, acute or chronic disease of the appendages cannot serve as indices of normality or disease of the appendix. Since it is impossible by gross appearance alone to determine which appendix may be diseased and since 50 per cent. of appendices removed in cases where the abdomen was opened for other purposes are diseased, the surgeon should, in the absence of contra-indications, remove the appendix in every such case.

Anchylostomiasis.—BARONI (*Gazz. degli osped.*, June 12, 1904) concludes that anchylostomiasis is a disease which if diagnosed early is neither dangerous nor hard to cure. If not recognized or properly treated it can be fatal to the patient and expose others to the infection. An enormous quantity of ova are passed by each patient, which rapidly develop into larvæ, which can penetrate into other human beings. This may take place by feces being passed into water, or earth that is being cultivated, and the hands of laborers become contaminated. Epidemics of anchylostomiasis are not unknown. When a man shows the typical anemia with other symptoms he

should be separated from other workmen and his feces burned. The chief symptom is a grave anemia, which does not readily yield to iron, suggesting pernicious anemia, latent malignant tumor, gastric atrophy or malarial cachexia. Microscopical examination of the feces will show the eggs, though this may have to be repeated several times. The intoxication of the organism is the cause of the various symptoms, shown especially by the toxicity of the urine; treatment consists in emptying the intestine, and preventing a rigorous diet. Thymol and castor oil are the best drugs. The patient should remain in bed.

Disinfection of the Biliary Passages.—Of the various disinfectants which pass over into the bile, F. KUHN (*Zeitsch. f. klin. Med.*, Vol. 53) found that thymol and menthol possesses the strongest antiseptic properties. With ordinary medicinal doses the amount secreted would not, however, be sufficient, so that the next drug on the list, sodium salicylate, is recommended. In a strength of 0.1 per cent., the growth of germs is retarded, while 0.6 per cent. will completely sterilize the bile. Drugs which act in higher concentration are naphthol, aspirin and citarin, but ichthylol and saccharin are almost valueless.

Hyperacidity in Gastric Cancer.—It is well known that acidity is the rule in cancer of the stomach, except where the tumor has developed from an ulcer, or marked nervous symptoms are present. V. ZIEGLER (*Zeitsch. f. klin. Med.*, Vol. 53) has, however, seen several cases where the previous history did not point to ulcer or nervousness and where distinct symptoms of hyperacidity were present. He divides the disease into three stages: (1) Stage of uncomplicated hyperchlorhydria in patients of advanced age, formerly well. Half to two hours after meals these patients complain of pressure in the epigastrium and heart-burn. Though the appetite is good, coffee, wine and tobacco no longer agree and constipation is obstinate. The test meal will show a total acidity of 90 to 120, with 58 to 80 free hydrochloric acid, but without lactic acid or characteristic bacilli. The physician believes he is dealing with a case of ulcer or simple hyperchlorhydria, but the usual treatment causes no improvement. (2) The amount of acid may be normal, increased or diminished. Mucus is increased and motility impaired. The general condition is no longer good and the patients complain of anorexia, loss of weight and pain, no matter what is ingested. The tongue is coated and traces of lactic acid with Boas-Oppler bacilli may be found in the stomach. In the third stage finally the patients present the usual picture of cancer. It is clear that a diagnosis may be impossible during the first and second stages, but attention should be directed to the following facts: (1) Silver nitrate, bismuth, alkalies and atropine only cause temporary improvement. (2) A remarkable dislike toward meat is often present. (3) The advanced age will speak against uncomplicated hyperchlorhydria, and there may be some anemia. (4) The development of a gastritis with impaired motility is very suspicious.

Diagnosis of Anemia.—E. BIENACK (*Zeitsch. f. klin. Med.*, Vol. 53) is strongly opposed to the common practice of calling every patient with pale mucous membranes anemic. Anemia is a dilution of the entire blood, and can only be diagnosed by an exact analysis of the amount of hemoglobin and the number of red cells present. If the blood of many pale patients be examined, normal figures will often be obtained for the dry residue, and iron, instead of improving, will make the condition worse. The patients really belong to the large class of functional neuroses and their pallor is due to spasmodic contraction or congenital stenosis of the peripheral vessels. The characteristic yellow color is not present and

heart murmurs do not occur. The author believes that fully 60 to 65 per cent. of all so-called anemics belong to this class.

Systemic Infection with the Colon Bacillus.—In cases with typhoidal symptom-complex but no clear history of typhoid, it should not be forgotten that the colon bacillus may be the cause. The patient of W. BAUERMEISTER (*Zeitsch. f. klin. Med.*, Vol. 53) presented the following symptoms: Continuous fever, severe headache, chills, vomiting, pains in back and abdomen, slight bronchitis. Characteristic symptoms of typhoid, such as roseola, swelling of the spleen, diazo and hypoleucocytosis were not, however, present. The diagnosis was established beyond doubt when colon bacilli were grown from the blood and urine. The patient improved but amputation of the testicle became necessary later. From the testicular pus, a germ was isolated which resembled the typhoid in many respects, yet the author believes it was merely a colon bacillus with diminished virulence.

Cause of the Pulsus Paradoxus.—Pulsus paradoxus is a name applied by Kussmaul to a pulse which becomes smaller during inspiration and regains its normal volume with expiration. Since the symptom has been most frequently observed in chronic mediastinitis it has generally been assumed that adhesions connecting the aorta with the neighboring structures have been responsible. E. REICHMANN (*Zeitsch. f. klin. Med.*, Vol. 53), however, offers the following explanation: During normal respiration the difference between expiratory and inspiratory intrathoracic pressure is so slight as to be without influence upon the blood within the great vessels. If dyspnea, however, is present, the difference is much greater and more blood will be received into the aorta during the marked negative pressure incident to inspiration, so that the peripheral pressure falls considerably. This will naturally be more marked where heart-action is feeble or bands press on the vessels.

Early Diagnosis of Gastric Cancer.—Many bacteria have been found at various times in the stomach contents of patients suffering from gastric cancer, but only the long or Boas-Oppler bacillus seems to have diagnostic importance. In a case which had been examined repeatedly by S. HEICHELHEIM (*Zeitsch. f. klin. Med.*, Vol. 53), these bacilli were never found, until the expression contained a blood-clot which turned out to be almost a pure culture. A diagnosis of cancer was then made, and confirmed at operation. Other cases were then examined, and small, brown coagula with bacilli found in almost every instance, except where the tumor had not yet ulcerated. In simple gastritis with diminished or absent hydrochloric acid, the coagula are very rare, and if they do occur, will never contain such masses of bacteria. Indeed, their presence seems to be one of the earliest signs of cancer. Even in tumors secondary to ulcer, and with considerable free hydrochloric acid, such clots are frequently found.

Hyperacidity and Its Treatment.—If stomach analyses are made systematically in all disturbances of the digestive tract, even when the symptoms are not primarily gastric, one will be astonished to find how common hyperacidity is. In many cases the patients themselves are totally unaware of this condition and merely complain of symptoms referable to neurasthenia. In a second class, the main complaint is constipation, and drugs with change in diet, directed against this will often cure the stomach as well. The third type has distinct gastric disorders and the nutrition is often below par. In these cases C. v. NOORDEN (*Zeitsch. f. klin. Med.*, Vol. 53) has seen the best results from enforced feeding. Even where there is a distinct anatomical lesion, as in acid catarrh and gastric ulcer, it is desirable to give large amounts of food after the first eight or ten days of moderation.

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HEAT EXHAUSTION AND SUMMER DIARRHEA.

It is well known that summer diarrhea in children occurs much more frequently toward the end of the summer than during its earlier weeks. The reason for this is acknowledged to be that the hot weather reduces the resistive vitality of the child. At first the infant is able to stand a certain amount of irritation of the gastro-intestinal tract without severe reaction. After it has been weakened, however, by exposure to heat and milder attacks of digestive disturbance during the early part of the summer, severe and even fatal diarrhea may result after only slight irritation.

Notwithstanding the recognition of these facts, and the indications to which they so clearly point, they are not always heeded. The most important element in the care of a child during the hot weather must be to keep it cool. For this purpose it is necessary that it should be very lightly clad, should not be allowed to sleep on soft, yielding beds or pillows, and should be frequently bathed in cool water. We have come to realize now that thermic fever may exist in slight degree without necessarily going to the extent of actual unconsciousness or other severe forms of so-called sunstroke. We know, too, that if patients are

kept cool the danger of such thermic fever becoming serious is very much lessened.

Dr. Illoway has recently insisted, in his little volume on the "Summer Diarrheas of Infants," that thermic fever is not infrequently the basis of the pathological condition on which severe summer diarrheas develop. If by various artificial means children can be kept cool there is much less likelihood of these dangerous complications. There is still a prejudice in the minds of most people with regard to the frequent use of cool water for children's baths, and the medical profession could confer no greater boon on the suffering little ones than to emphasize the necessity for frequent bathing, not only after the infant has begun to show signs of irritability from the severe hot weather, but as a prophylactic measure, while it is still in good health.

Besides this there is need for emphasizing that important element of baby's care, the significance of which is only just beginning to be generally realized, that for comfort's sake the infant must be handled just as little as possible.

As the summer advances and resistive vitality and irritability increases, handling is more and more objectionable. Adults find contact with one another during hot weather extremely disagreeable. Infants, unable to secure any change for themselves, are sure to suffer even more. The bacteria productive of gastro-intestinal disturbance are only one element in the production of disease, the other is the lack of individual resistance, and there are those who would insist that this latter is quite as important, and that, indeed, on it depends the virulence of the disease.

RECENT STUDIES ON RADIUM.

As might very well be anticipated from the exaggeration of the first accounts with regard to the employment of radium in medicine and surgery, there has been a decided reaction, and some assertions have found their way not only into newspapers, but even into the medical press, that radium can be of no possible service in therapeutics.

It will be of interest then for our readers to note that at a meeting of the New York Academy of Medicine, held May 19, an account of which will be found in the society proceedings of this week's MEDICAL NEWS, observers who have been faithfully working with the metal, but not announcing their results before they knew what their results really meant, have some encouraging

things to say with regard to the therapeutic possibilities of a new and marvelous substance of which so much was expected, and not without good reason.

At that meeting Dr. Piffard called attention to the fact that the radiations from radium occupy an intermediate position between those which are used for therapeutic purposes in the Finsen light and the X-rays. His expression that the radiations of radium are really a transcendentalized pocket edition of the X-rays expresses this thought very succinctly. The radium rays are not simple, but consist of alpha, beta and gamma rays, which have been observed from other sources as well as radium, but seldom in such readily available quantity as from this new element. The alpha rays are probably positive electrons, the beta rays are negative electrons. Both of these are corpuscular in character and have a definite size and weight. The so-called alpha rays are material particles, probably of about twice the size of an atom of hydrogen. The beta rays are probably of about one-thousandth the size of an atom of hydrogen. As the atom of hydrogen has been up to the present time considered so small as to be the standard of weight in atomic weights in chemistry, it can readily be understood how minute this new particle of matter is thought to be. The gamma rays from radium are true etheric waves, probably not corpuscular in character and possess great penetrative power. The alpha and beta rays are very much hindered in their action by the material in which the radium is kept. Glass, for instance, lessens their activity to a very great extent. Dr. Piffard has found that aluminum makes a much better substance as a retainer for radium than glass. In most cases the external pressure is produced by the emanations of radium, which are different from the radiations from radium, and which are found to be mainly composed of helium. These force their way through defects, air bubbles and the like that may exist in the glass phials in which radium is kept. Even when aluminum is used, Dr. Piffard has found that the emanations find their way apparently through the pores of this metal, and their disappearance always leads to a lessening of the radio-activity of the radium. As a consequence he has found it necessary to enclose the aluminum tubes in which radium is kept within tubes of some other metal, using silver for the purpose because of its density.

Dr. Abbe called attention to certain recent

observations with regard to the biological effects of radium. If seeds are exposed to the action of the metal for several days they are very much retarded in their growth. Those seeds are most retarded which have been longest exposed. On the other hand, in insect life a very curious result has been noticed. If the larvæ of insects are exposed to radium, those that survive the exposure fail to go through the ordinary transformations and to exercise their reproductive capacity. Meal worms, for instance, exposed to radium do not become pupæ and then beetles which lay eggs, out of which further meal worms develop, but continue a prolonged existence as meal worms. These meal worms live on for several generations after their contemporaries metamorphosed, have given life to new generations which in turn have gone through their transformations in a natural way. The exposed meal worms may live the length of several generations in the worm stage without any tendency to be transformed.

The application of such an inhibitory property for the rapidly multiplying cells of cancer at once suggests itself. Where the radium can be so applied as to act directly upon the cells of malignant growths either sarcoma or carcinoma, it has the happy effect that might be anticipated. There is every reason to continue the experimental use of the metal in surgery, especially as lupus, warts and other benignant skin tumors are favorably affected by it.

A TEXAN WELLSPRING OF PLEASURE.

THAT certain people are possessed of a certain peculiar power, and are endowed by nature with some inherent ability to perform minor miracles, has long been a popular belief. Thus, as the law of compensation always enlarges the supply to meet the demand, we have become surrounded with an increasing class of astrologists who can read their victims better than they can the stars, and of fortune-tellers who will prognosticate anything for the moderate sum of one dollar.

These people all, however, belong to the genus "fake"; they live in cities and are surrounded by the paraphernalia of their trade, and if anyone is fool enough to part with his money to them it can generally be regarded as a divine interposition on the part of Providence to prevent it luring him into more serious trouble. As a class they all bear a striking resemblance to each other. The men are, as a rule, thin and hectic, a cross between the Edwin Booth Hamlet type and that of

the melancholy Jaques, while the women, on the contrary, are possessed of that exuberant glandular development which is characteristic of advanced maternity, with blondined hair, the roots of which seldom justify the ends.

Of the making of these imposters, like that of books, there is no end, but that, as Kipling says, is another story. But every now and then some apparently well-authenticated case comes up of the alleged power of some particular individual to do a peculiar thing that is "beyond the power and against the ken" of the ordinary mortal. These manifestations usually occur in what might be called the middle register, both in regard to the social position of the performers and their age. Another singular fact seems to be that these mediums have no previous knowledge of the power that lies in them until it suddenly breaks out in a volcano-like eruption, and that the evidence of it seldom becomes apparent until long after the consciousness of its possession would have been of the greatest financial advantage to them. This, however, in most cases, is soon remedied, and the nebulous current derived from God is speedily short-circuited to serve the practical purposes of Mammon.

Now, if "Mammon was the last ejected spirit that fell from Heaven," as we are taught, there is every reason to believe that she alighted with the dull thud of gold in Texas. It also seems that Henry Zachary, a plowboy of fifteen years, can be metaphorically cited as a correspondent in her fall, and that he was mashed by her. At all events, a few short weeks ago he was eating bread and cheese, when he could get it, with a strong and healthy appetite. He was also supporting himself and his blue jean overalls by the single suspender of a strict attention to drawing his furrow as straight as the Texan law allowed; while his financial standing in the community was synonymous with that of the church mouse.

Now it is all changed, for the wealth of Ormus and the Ind is his, and his plowshare has been beaten into the sword that has pried open the oyster of success. He has a two-bladed "Barlow knife" and gum galore to chew, while his dependent father loafs in a Tuxedo coat about the farm and smokes "seegars." All this is due, it seems, to a magic power that the boy's hands possess, by which, according to the published report, he can "locate minerals, water or oil at a great depth, with a certainty never before known." It appears that while he was holding the plow in one of his father's fields he was seized

with a peculiar and well-defined tingling in his fingers whenever he passed over a certain part of the lot. This sensation returned, too, with accumulative effect, on every succeeding arrival at this particular spot, until he was forced to cry out for his father's help.

Now, Farmer Zachary is not a typical visionary man. Strong he is, and planted firmly on feet that can trudge uncomplainingly over more rough ground than two strong oxen can plow from morn 'til night. So he ridiculed the boy, and told him "not to take his hands from off the plow," and quoted Scripture to him. But all without avail. Finally, as the father was unable to do two things at once, he stopped plowing and began to think. Wearying with the unaccustomed task, he at length arrived at the conclusion, reached by the most acute of all French minds, that it takes longer to think about a thing than it does to do it, and he promptly acted.

Well diggers were set at once to work and found a goodly supply of excellent water, though at a considerable depth below the surface. This miracle was repeated on a neighboring farm, and then the lad's fame spread, like a wave of the incoming sea, completely over Caldwell County, submerging the local diviners and floating their forked twigs and rods out into the dim ocean of obscurity.

And now no man can dig a well without his aid, or sink a shaft until his tingling fingers have pointed out the spot; nor, if report be true, will these peculiar hands, that have become cramped around the handle of the plow, unbend into any practical usefulness until the itching in the open palm is soothed away with Mammon gold.

ECHOES AND NEWS.

NEW YORK.

Entertainment for German Scientists.—The "Union of Old German Students in America" will entertain the German Scientists who attend the St. Louis Congress of Art and Sciences at a "Commerz" in Arion Hall, October 8. Most of the eminent guests are medical men.

Dr. Bellamy Injured.—Dr. J. R. Bellamy was injured in a polo game at Van Courtland Park August 17. It was feared that he had sustained a fracture of the skull, but it was said at the Madison Hospital later that Dr. Bellamy was gradually regaining consciousness and that his chances of ultimate recovery had very much improved.

Gouverneur Physician Exonerated.—An examination into the death of Henry M. Miller, a Bellevue Hospital orderly, at the Madison street police station on Sunday morning, has resulted in the exoneration by the Bellevue Hospital authorities of Dr. A. W. Taves, of the Gouverneur Hospital staff, who was called to attend

Miller in Seward Park the previous evening. Dr. Taves offered to take him to the hospital, but he refused to go in the ambulance, and as he was not under arrest Dr. Taves could not forcibly take him. Later Miller was arrested and taken to the police station, where he died. The physician's action in the case has been approved by the hospital authorities, including the superintendent of Gouverneur Hospital.

St. Elizabeth's Hospital in Litigation.—The Supreme Court has been asked to direct the Windsor Trust Company to pay over \$70,000 which the Pennsylvania and Long Island Railroad companies paid as the fixed value on St. Elizabeth's Hospital, at 223 and 225 West Thirty-first street, a part of the site of the new Pennsylvania terminal station. There is some discussion concerning the disposition of the funds arising from the fact that the old hospital was conducted by a lay order, while the new one is to be conducted by the church.

Health Department Examinations.—An examination of applicants for the position of assistant physician in the hospitals for contagious diseases connected with the Department of Health will be held at the Willard Parker Hospital, at the foot of East Sixteenth street, on September 1 and 2, 1904, at 2 P.M. Applicants should have had a general hospital training, or practical experience in the care of infectious diseases. The positions are salaried. Examinations will be both written and practical, and will include general medicine, surgery, pediatrics, bacteriology, pathology and infectious and contagious diseases.

An Effort to Decrease Infant Mortality.—The Department of Health has issued explicit directions for the care of infants during the summer. The damp weather of the last two months has caused an extraordinarily high infant mortality, the average since July 2 having been 377 a week, against an average last year of little more than 200. Much is done by charitable citizens and institutions by providing excursions to the country for the sick children. It is impossible to afford opportunity for more than a trifling part of the infants of the poor to get fresh air. It is practicable, however, to see that every family is properly instructed in the rudiments of nursery hygiene and sanitation, and organized effort in this direction has led the Health Department to formulate the following instructions: *First*—Nurse the baby, and nurse it regularly, about every three hours. If you cannot nurse the baby consult your own physician or send to the Department of Health for a physician. *Second*—Do not give the baby condensed milk. *Third*—Never use the loose milk sold in grocery stores as food for the baby. *Fourth*—Never give the baby raw milk in warm weather. *Fifth*—Use only bottled pure fresh milk, properly prepared and sterilized, and feed the baby at regular intervals, about every two and a half or three hours. *Sixth*—In the morning prepare and sterilize enough milk to last the baby during the day and until the next morning. Cover each bottle and place on ice after sterilization. *Seventh*—See that the nursing bottles and nipples and all dishes used to hold the milk are kept absolutely clean. Wash these utensils in hot soap suds and then rinse in scalding water each time before using. *Eighth*—The water that is used to dilute the milk must be boiled. *Ninth*—Send to the Department of Health for a circular telling just how the milk should be prepared and how the baby should be fed and cared for, or notify the Department of Health that you want a trained nurse to show you how to prepare the food. *Tenth*—Send at once to the Department of Health or for your own physician if the baby becomes ill. Stop giving milk during the illness of the child, and give the milk only when the physician directs it.

PHILADELPHIA.

Jefferson Hospital.—Work on the new building is progressing, most of the first set of posts of the superstructure being in place. A small portion of the east side of the old building has been taken down to allow building of a new chimney.

St. Luke's Hospital.—Contract has been let for alterations on the new building at Broad and Wingohocking streets. The work will be completed by the end of November, when the hospital will be moved from its present location. The new plot is 225 by 400 feet, which gives ample room for additional buildings.

Certificates for Pharmacists.—At the examination held by the State at Williamsport on July 19, 87 of the 155 applicants were successful in obtaining certificates. Among these were 56 of the 101 who took the examination for registered pharmacist and 31 of the 56 examined for qualified assistant's certificate.

Ask Power to Cancel Licenses.—The Pennsylvania State Board of Medical Examiners is to ask the legislature to grant the power of recalling and cancelling any license issued by them. This is for the purpose of dealing with any person who from lack of education other than medical, or because of his moral character being of such degree, is not qualified to act as a physician. Such men may now practise until caught at some criminal operation. Hereafter certificates are not to be given by the board to illiterate candidates, even though they possess the requisite technical knowledge. It is believed that the power to revoke licenses will prove the best method of dealing with malpractitioners.

Examination of Athletes at Pennsylvania.—Dr. R. T. McKenzie, the new physical director of the University of Pennsylvania, will allow no student to participate in any line of athletics unless examination shows the man to be fit to endure the strain. The evils which the medical profession point out in the overexertion and physical injuries of college sports are brought about by the lack of just such examinations as will, in the future, be compulsory at this college.

CHICAGO.

Lessened Mortality Among Young Children.—The City Health Department has the following to say regarding the low mortality among children this season: "One of the most remarkable features of the present season, as to the public health, is the unprecedentedly low mortality from contagious diseases of childhood, and as a consequence a very low general death rate for the city. Only one death each from diphtheria and measles, three from scarlet fever, and four from whooping-cough were reported during the week. Since the first of the year have been 21 deaths from diphtheria; during the corresponding period of 1903 there were 328 diphtheria deaths, a decrease this year of more than one-third. Deaths from scarlet fever show a decrease of 52.2 per cent.—241 last year, 115 this year. In the whooping-cough mortality the decrease is 80 per cent.—241 deaths in 1903, 48 in 1904. Against the 23 deaths from measles since January 1, 1904, there were 258 in the corresponding period of last year, a decrease of 91 per cent. The gross mortality of the four principal contagious diseases of childhood thus far in 1904 is not much more than one-third (37.3 per cent.) that of the corresponding period of 1903."

Prevalence of Smallpox in Zion City.—Sixteen cases of this disease are reported from Zion City, and the adjoining towns are taking precautions to prevent its spread.

Mortality for Week.—Acute intestinal diseases head the list of deaths with 111; violence caused 62 deaths;

consumption, 56; heart disease, 41; Bright's disease, 29; cancer, 22; and pneumonia, 20. The total deaths were 496, equivalent to an annual death rate of 13.41 per one thousand.

GENERAL

Gift to St. John's Hospital at Yonkers.—The late Cornelia A. De Wint has bequeathed to St. John's Riverside Hospital at Yonkers, \$10,000.

Tuberculosis Congress.—The American International Congress on Tuberculosis will be held October 3, 4 and 5, 1904, under the auspices of the Universal Exposition, St. Louis, 1904, the American Congress on Tuberculosis and the Medicolegal Society of New York.

Supposed Dead Doctor Returns.—Dr. R. G. Lightle, who was supposed to have been burned in his barn at Searcy, Ark., May 22, and on whose death insurance companies paid \$19,000 on policies, has returned. He says he went away suddenly because he had a corpse in his barn for dissection, and when the building burned he feared he might be arrested for grave robbery.

Vaccination in Hydrophobia.—Consul General Guenther, at Frankfort, Germany, has supplied to the State Department official statistics concerning the efficacy of vaccination as a preventive of hydrophobia. The substance of these is that only 1½ per cent. of persons bitten by mad animals and vaccinated have died. The figures also show that Russia is the breeding place of hydrophobia.

Snake Venom and Cold-blooded Animals.—The action of snake venom on cold-blooded animals has been tested by Dr. Noguchii in a long series of experiments (Carnegie Institute of Washington, Publication No. 12). Three venoms were employed, viz., those of the cobra, water moccasin and rattlesnake. Snakes and frogs succumb easily to cobra venom, but are relatively insusceptible to the other venoms; turtles are more susceptible to all venoms than the foregoing, and fish are still more so. The grasshopper and some crabs are almost insusceptible, while the lobster is only moderately resistant. Excepting the earthworm, all the worms showed a low degree of susceptibility. The venoms have little effect on the *Echinodermata*; sea urchins succumbed, however, but starfish and sea cucumbers were not perceptibly affected.

Nerve Energy and Electricity.—Recent investigations by Dr. Jacques Loeb and others, according to the *Sat. Evening Post*, seem to point to the conclusion that the nerve centers of the human body are in a true sense storage batteries charged with electrical energy. It is not unreasonable to imagine that what we call fatigue may be due to the temporary exhaustion of the battery-power. The batteries contained in the "wings" of the fish known as the "torpedo ray," which is able to inflict a shock that will stun a man or a horse, are regarded by anatomists as modified muscles. They are composed of an arrangement of cells, corresponding to small Leyden jars, in which electricity is stored through the medium of the nervous system—a fact proved by the circumstance that, when the connecting nerves are severed, the organs lose their power to give a shock. It is much the same way with the so-called "electric eel," and with a species of catfish which is likewise a dealer in small thunderbolts. Observation of the phenomena described makes obvious the close relation between electricity and nerve energy. When the human body is at rest the storage batteries, which are called the nerve centers, are slowly charged. During the day the supply of energy is gradually dissipated, and nature demands another period of repose in order to refill the battery cells. Such, though the theory is as yet more or less speculative, is the belief toward which science at present is leaning.

Asepsis and Antisepsis.—It has been known for some time that a reaction was in progress from the extremes to which the German school has carried asepsis in surgery, says the *New York Times*. The movement started by Lister was in itself a reaction from the slovenly practices which obtained before his time and had something of the character of a reform. Professor Dr. O. Rosenbach, of Berlin, in his "Arzt contra Bakteriologie," finds the courage to enter the lists with the following challenge: "The time is not far off when antiseptics will, in most cases, be used only for disinfecting the external skin and the instruments. Water and soap will be reinstated in their place of honor as cleansing materials. The quintessence of antisepsis, as explained long since by many successful operators whose work is done without the aid of bactericides, which, in truth, had better be called tissue destroyers, or protoplasm poisons, will be reduced to an endeavor to avoid the introduction of additional virulent agents into the human organism by our operative measures which must in part destroy the protective barrier of the organism owing to the necessity of entering the interior of the body; therefore, to operate with clean hands, clean skin, and clean instruments, as well as, above all, to handle or squeeze tissues as little as possible in order not to reduce their defensive apparatus by local necrosis, and thus to assist in facilitating the process of regeneration. That all this may be accomplished by the simplest means of relief, provided practice and dexterity are in evidence, reducing the insults to a minimum, is illustrated by the history of ovariectomy. An operator who works gently and deftly, and does not imagine that under cover of strict antisepsis any and every abuse of tissue is licensed, will always command brilliant results. The dogma of the efficacy of purely external disinfection being such absolute protection as to render superfluous any regard for the patient or the healing powers of nature, has been provocative of more mischief than the adherents of absolute protection by means of toxic antiseptics will ever care to acknowledge." In commentary the *Times* says that perhaps the pendulum-swing in his case only illustrates the law that action and reaction are equal, and it may very well be that the truth lies somewhere midway between the views he combats and those he announces.

Control of Opium in Formosa.—In the report of Mr. Consul Playfair on the trade of North Formosa particulars are given of the manner in which the opium trade is regulated. The authorities are doing their best to put down the opium habit; no one but the government is allowed to deal with opium in any way, save those who are licensed. Only those proved to be addicted to opium are given permission to buy and smoke it. Exceptionally heavy penalties are inflicted on those detected in importing, selling or smoking the drug without permission. The revised regulations for the application of the opium law show that the government makes three qualities. Agents and dealers in opium have to be non-smokers and persons of good character. They are licensed, as are the smokers, and the latter must always produce their licenses when purchasing opium, of which only a certain quantity can be bought. The price is fixed by the government, and the selling agent who supplies the retailer is only allowed a profit of 1½ per cent. He pays three yen a year for his license, and has to report monthly the quantity and value of the opium he has sold since the last report. The retailer also has to pay three yen per annum for his license, and has to keep a careful account of his transactions and report to the police. The attempt to control the opium habit caused at the outset many disturbances, and the authorities found great difficulty in ascertaining the number of smokers, as people refused to give information; it was not until late in 1900

that it was believed that all the opium smokers in Formosa were registered. Since that date it is reckoned that the number of smokers has decreased by about 1,000 a month. There are three grades of opium made at the government factory, all of which those who can afford to buy a first class ticket (red) at 3 yen per month may purchase and use. The second class smoker pays 1 yen 50 sen per month for a green ticket, entitling him to buy the second and third grades of opium, while the third class smoker pays 20 sen monthly for a yellow ticket, conferring the right to indulge in the commonest quality only. The use of opium in Formosa is steadily declining, the result not only of law but also of public opinion.

Japanese Field Surgery.—Dr. Louis L. Seaman, of New York, writes that the Japanese are giving proof of the benefits to be derived from the non-interference with wounds on the field, where they content themselves with the application of first-aid bandages and antiseptics, leaving the more serious work to be done in the hospitals at home. This course is followed except where there is danger of the wounded man bleeding to death or where his condition is very precarious. The result of this practice has been that many men suffering from bullet wounds at the front are nearly well when they reach Japan. In one hospital ship returning to Japan from the front there were 2,200 wounded men, and there was not a single death on board during the trip. There have not been more than three deaths among the wounded who have been returned to Japan after having received first-aid treatment only. If the Japanese soldier is not killed outright, Major Seaman says, the chances are that he will recover. His emperate habits and his plain and healthful diet of fish and rice, varied occasionally with meat, contribute much to his recovery. Russian wounded captured by the Japanese have been treated in a similar manner, and the recoveries among these men are scarcely less in proportion than among the Japanese. A new complication has been discovered in the wounds sustained in this war due to the extraordinary high speed of small-calibre bullets, which produce aneurisms by their speed. Dr. Seaman saw twenty-seven operations performed for the relief of this condition.

OBITUARY.

DR. D. M. BARNETT died August 21, at his home, in Claremont, Texas, aged ninety-five years.

DR. GEORGE T. HESTON, a descendant of Llewellyn, King of Wales, died at his home at Newtown on August 19, aged seventy-eight years. He studied at Haverford College and the University of Pennsylvania, and later made a trip around the world as surgeon on the bark Adelaide.

DR. J. FREDERICK NOTT, of New York City, died in the Maine General Hospital, at Portland, Me., August 19. Dr. Nott, who had boarded an express at Kennebunk, bound for Bar Harbor, was taken ill a short while before the train was due in Portland, and when that city was reached his condition was so serious that it was decided to remove him to a hospital.

Physical Deterioration Among the English.—The English Inter-Departmental Committee on Physical Deterioration has issued its report in London. It deals at length with conditions of employment, urbanization of people, depletion of rural districts, question of food, etc. It may be necessary, the committee says, in order to complete the work of clearing overcrowded slums, for the State, acting in conjunction with the local authority, to take charge of the lives of those who, from whatever cause, are incapable of independent existence up to the standard of decency which it imposes.

SPECIAL ARTICLES.

BYWAYS OF MEDICAL LITERATURE.—XXII.

CHEMISTRY AND MEDICINE.

A VERY interesting article on the relation of modern chemistry to modern medicine, an address delivered before the Sigma Xi Society of the University of Kansas, by Professor J. H. Long, furnishes an excellent idea of how far chemistry can be helpful in practising theory in modern medicine. Especially with regard to the much-disputed question in recent years of the action of ferments, Professor Long's opinion should be known by all those whose duties as teachers lead them often to talk of ferments and fermentations. Very seldom has a difficult question been put so clearly, so simply, and at the same time so thoroughly up to date.

"It was certainly an auspicious day for chemistry, and medicine also, when Pasteur developed his biological theory of alcoholic fermentation. Not long after came the work of Kühne, Brücke and others on the enzymes, already referred to, and finally Buchner, to clearly demonstrate the long-suspected enzymic character of the yeast ferment. Practically all recent work in this direction has gone to show that so-called organized fermentations are all dependent in turn on enzymic ferments contained within the cells. This distinction may probably be made: In the yeast fermentations, for example, the sugar to be converted is drawn into the cell, and the products, alcohol and carbon dioxide, formed by the zymase, are in turn excreted. In diastasic and similar fermentations, on the other hand, certain cells produce an active ferment which is discharged to do its work outside the generating cell. The difference is thus seen to depend on the place where the reaction occurs, which is not a very important point. The ferments are essentially complex chemical substances, able to bring about various reactions, nearly all of which are of exothermal character. Of the nature of many of these reactions we have pretty accurate knowledge, although of the exact mode of action of the enzyme itself our knowledge is scanty. For the present purpose, however, it is sufficient to recognize that these reactions are chemical and we are in a position to trace their bearing on medical problems.

"The simplest problems of enzyme action we have in the work of some of the so-called digestive ferments. In the changes wrought in starch by the saliva and by one of the pancreatic ferments the chemical action is one of hydrolysis and very similar to that occurring commonly in the vegetable world. In the germinating seeds, when starch becomes sugar to feed the developing plantlet, water is added through the aid of diastasic ferments, and later, in the ripening of many fruits the same kind of reaction takes place. These effects, however, are not peculiar to the enzymes; experiment shows that the same starchy substances acted upon by weak acids pass through the same series of changes occurring in the body, and even prolonged heating with water has the same general effect. The hydrolytic and purely chemical nature of carbohydrate digestion becomes at once apparent. What happens in the digestion of fats is equally simple. Here, too, hydrolysis plays the most important part and the work of the lipase enzymes can be duplicated in the vegetable kingdom and also in the laboratory by the aid of the simplest of inorganic reagents. A far more difficult problem for a long time was to account in any way for the changes taking place in the digestion of proteins. The presence of a proteolytic enzyme in the gastric juice, was recognized definitely by Brücke over forty years ago, and about the same time a substance called trypsin was found in the

extract of the pancreas. These substances acting on proteins under certain conditions convert them into a series of intermediate and end products about which an enormous literature has been developed. In the course of the long discussion it was discovered that many of the products which are formed by the enzymes may be obtained by the action of weak acids or alkalies, or water even, at an elevated temperature, on the original proteins, and finally, it was shown that an increase of weight follows in these cases as in the case of the addition of water to starch. All this evidently places the phenomena of protein digestion in the group of hydrolytic reactions, along with the much simpler starch and fat reactions. The digestion processes are, therefore, chemical, and the only thing about them which remains mysterious is the fact that from one set of body cells a ferment working in acid medium is produced, while from a second set of cells a somewhat similar ferment working in an alkaline liquid is secured."

MAREY'S LIFE WORK.

THE death of the experimental physiologist Marey is another reminder of the progress made in our senses as well as in medicine during the last half century. His great work was the application of graphic methods to the study of animal movements. It was back in the sixties that he began inventing the registering apparatus for heartbeats, and the sphygmograph is now a classic instrument of observation. But for the general public his success in photographing successive animal movements have had the most striking results.

Let any one compare the prancing, symmetrically balanced steeds of Horace Vernet's battle pictures with the representations of horses in rapid motion made by artists since Meissonnier and he will see how great an education the human eye has received in a few years. Meissonnier painted before Marey's investigations, and all the critics fell foul of his horses. Marey proved that Meissonnier simply saw movements accurately and that the galloping steed of previous painters was usually as much a dream of the painter as are the crude drawings of children. He pointed out that the ancient Greeks had also seen the horse accurately in their sculptures. No one doubts it now, and we have all learned to look a little sharper and with more instant analysis.

It is true that the eye is not a photographic lens, but rather transmits to our consciousness something like a composite of the rapidly succeeding movements. But we have learned to look intelligently at nature in motion, just as impressionism has led us to attend more closely to the shades of color of nature in repose. Marey's work on the flight of birds in like manner showed that the Japanese artists had caught the truth of motion in the matter, and now our own designers have learned the trick. An accepted demonstration in mechanics was upset by one of his disciples who followed his methods and photographed sixty-five successive movements made by a cat in falling from a height, turning on herself in the air, and landing safely on her feet. Here, too, the popular notion was true and science had to revise its calculations, which was brilliantly done by a young French mathematician in his thesis for his doctor's degree.

Up to his death Marey was engaged in this visual interpretation of mechanical science, which has been so fruitful in his hands. I cannot appreciate here the immense sum of work accomplished in other lines by this typical Frenchman of science of devouring activity. His last writing was to urge the importance in traction vehicles of elasticity as an economizer of work. He has long been attached to the Agricultural Experiment School (physiological station), kept up by the French

Government, and he had a laboratory at the College de France. With a moderate but sure maintenance and facilities for his special experiments and for the publication of results, his career has been one of ideal success, for the professor was devoted to his calling. Honors came to him thickly, and he had long been a member of the Academy of Medicine and of the Academy of Sciences.

YE OLDEN TIME DOCTOR.

THE *Atlantic Monthly* some months ago published some leaves from the notebook of an old-time practitioner of medicine that are of great interest, and that bring home very well the differences of practice then and now. The experiences are told in straightforward fashion, with all the simple details that show their truth to nature and make them worthy to be preserved in the notebooks of those who are interested in the history of medicine. Of course the prominent feature of practice was as it always has been and doubtless will be an assumption of knowledge as to the exact diagnosis of disease which favored the persuasion of a hopeful therapeutics. Always general terms have been employed to cover a multitude of diseases and at the same time the ignorance of the physician. An impartial survey of the state of our own diagnosis and therapeutics will temper our ridicule of his. Perhaps it may even serve to inject a wholesome element of the doubt that happily leads to investigation and, consequently, to progress:

"I saw a vast deal of practice, I assure you. Besides children's diseases, we had quinsy sore throats and congestion of the lungs, as well as pneumonia, and what I wrongly pronounced 'Chilson fever.' But generally we diagnosed the case as liver trouble, and treated accordingly. Sometimes we gave calomel in pills, but we thought we got better effects from powders; the pills were so large and were so unevenly covered with a bitter powder,—and, though I became expert in rolling them, still they would bulge and stick and gag the people, who either could not swallow them, or else had later accidents,—that, as I say, we thought best of powders. And when I say powders, have you in mind a dainty paper with a pinch of salt, as it were, within its ingenious folds? Go to! Do you think we were mere homeopaths? We gave it in a teaspoon filled from a frequently replenished bottle carried in the doctor's capacious side pocket!

"This was the favorite medicine with patient and physician. No more grateful compliment came to the professional ear than the familiar 'I tell you, doctor, that last dose took hold right smart,' received with the complacent 'Well, I reckoned it would.' When salivation ensued, and the poor wretch had not a yellow tooth that did not rattle as he praised our skill, and the rebellious stomach refused to assimilate juicy spare ribs and the hot Sally Lunn, we gave him bumpers of bicarbonate of soda mixed with Brown's Essence of Jamaica ginger. He was taught that the disease was working out of the system, and that the ghastly symptoms were the inevitable sequelæ of a mysterious dispensation, which they probably were!

"We gave bushels of quinine, in tea to women, whisky, more plentiful than tea, to the men. I have spoken of calomel as the trump card which we played in the game with death, but I am not sure that we did not oftener take the trick with the lancet. We were hampered by no modern septicemic fears. The little instrument, arranged with an ingenious spring to prevent its opening, was carried in the vest pocket along with a plug of tobacco, a toothpick, and odds and ends of every sort. I doubt if there was a day we did not find use for it. We bled for headaches and fevers; we bled for congestion

of the lungs; we bled the negroes for their ills, generally designated by the generic term 'misery.'

The touch that shows how high was the estimation in which the kindhearted old-time doctors were deservedly held is not lacking. One is tempted to wonder if with all our advance in medicine we do our patients as much good as our comparatively ignorant medical ancestors. They inspired the confidence they felt themselves in their remedies and that is half the battle of therapeutics. When they could accomplish nothing their never-failing sympathy almost made up for their lack of efficiency and won them tender places in the regards of their patient, such as are not won by their more skilful brothers of succeeding generations. The whirligig of time brings in its revenges, but there are compensations always.

"It was etiquette with us that when a doctor fell ill the oldest physician in the town should have charge of the case, while all the others came in in consultation. There were thirteen in this town of less than three thousand inhabitants, and they all went through that sick room, following Dr. Ireland, the dean, and looked wise. Then the doctor sent for me. He said there was no luck in odd numbers, and, more than that, I understood his constitution! I spent many hours with him, and we talked of everything except medicine.

"But he did not get well.

"I think some men have to get sick to get rested," he said one day, when my face must have showed what I feared,—for, indeed, I feared greatly, most of all because he took no medicine. So at last I spoke. 'Doctor,' I said, 'would calomel or jalap do? Or, I know how to bleed.'

"And the old fun flushed his face as he said, 'Doctor, it wouldn't be etiquette without Dr. Ireland. Besides, dear little boy, burnt brandy wouldn't help me now.' The next day he died.

"The town was as full of spring carts and buggies and saddle horses the day he was buried as if it had been the day of the county fair. The negroes, breaking the bonds of their Protestantism, prayed aloud in the streets for his soul,—and the clergyman said: 'This man sought neither riches nor honor, but gave himself for others. Fifty years from now his name may be a faint memory, but I think he was one of those whom God depends upon to keep the world good, and to bless little children by his gentleness and purity and cheerfulness.' And all the people said, 'Amen.'

THE CIRCULATION OF THE BLOOD.

THERE is nothing more interesting, as there is certainly nothing more promising, than the many references in present-day medical literature to discoveries in medicine made long before the date usually assigned for such discoveries. There is at the present time a very sympathetic rereading and rewriting of passages of medical history in such a way as to give due credit to many patient faithful investigators of the olden time who found in their observations much more of truth than is usually supposed to have been possible before distinctly modern times.

The Harveian Oration in England was founded with a distinct idea of having an address delivered each year before the Royal College of Physicians of London on some subject connected with the circulation of the blood. It is especially encouraging then for those who are interested in truth for its own sake in medicine to find that the last deliverer of the Harveian oration, Dr. Richard Caton, the emeritus Professor of Physiology at the University of Liverpool, in fulfilling his task in this matter touches upon observations nearly related to the discovery of the circulation of the blood in Egypt some 5,000 years ago.

Dr. Caton dwells particularly upon the benefits conferred upon medicine by a learned physician who lived during the third dynasty about 3,500 B.C. He attained such eminence that in the course of subsequent ages he was deified and became for later generations the special god of medicine under the name of I-em-hotep, which means "He who cometh in peace." Later he became one of the great god triad of Memphis, and is described as "the good physician of gods and men, a kind and merciful god assuaging the sufferings of those in pain, healing the diseases of men, giving peaceful sleep to the restless and suffering; he is called the creative god, who giveth life to all men, who comes unto them who call upon him in any place and who gives sons to the childless."

Dr. Caton considers that the very early Egyptians practically discovered all that the Greeks subsequently knew about the functions of the heart and of the blood, and that it is indeed to their discoveries and not to actual observation that the Greeks owe what has come to be attributed to them by later generations. He said:

"It is of some interest to note that these priests of I-em-hotep, themselves learned men, not only saw and prescribed daily for vast numbers of sick persons, but also performed innumerable necropsies. They removed the heart, large blood vessels, viscera and brain from the bodies of diseased persons, also from the bodies of sacred animals, prior to embalment; the heart was placed in a separate jar by itself and the remainder of the viscera in a larger vessel; thus these men had an opportunity of learning something of anatomy; they may have gained some insight into the intricate problem of the action of the heart, the movement of the blood, and the changes of heart and vessels produced by disease; no nation of antiquity had such opportunities. Did they discover anything? I think I can demonstrate to you they did obtain a partial knowledge of the circulation; they did not solve the problem, but they approached it as nearly as did the Greeks, and probably from them the Greeks obtained such knowledge as they possessed in early times."

Of course all question of the circulation in early times were found to contain not blood but air, and that they were supposed therefore to be channels through which was obscured by the fact that after death the arteries the air of the lungs found its way to various parts of the body. Dr. Caton quotes, for instance, some comments from the early papyri which go to show how much more can be found by a sympathetic reader in these old medical documents than our distant predecessors in medicine were ever supposed to know. As a matter of fact there are some things in which there has been no advance even down to our own day. He said to his audience in the Harveian oration:

"Let me read you one or two extracts from the work of the Pharaoh Usaphais, quoted in Eber's papyrus: 'Man hath twelve vessels proceeding from his heart which extend to his body and limbs, two vessels go to the contents of his chest, two vessels go to each leg, two to each arm, two vessels go to the back of the head, two to the front of the head, two branches go to the eyes, two to the nose, two vessels go to the right ear, the breath of life goes through them, two go to the left ear and through them passes the breath of death; they all proceed from the heart.' The concluding sentence is the earliest example I know of the ancient superstition that the left side of the body is sinister and evil. This is very early anatomy, professing to be at least 6,000 years old; we must not expect it to be quite accurate. Turning to a comparatively recent period the only copy existing of Eber's papyrus (found in a tomb at Thebes) was written in or before

the sixteenth century A.C. No doubt most, if not all, its contents are much older than that date. The passage which I am about to read commences: 'From the secret book of the physician a description of the action of the heart and of the heart itself. From the heart arise the vessels which go to the whole body; if the physician lays his finger on the head, on the neck, on the hand, on the epigastrium, on the arm or the leg, everywhere the motion of the heart touches him, coursing through the vessels to all the members' (the reference is clearly to the pulse); thus the heart is known as the center of all the vessels. Four vessels go to the nasal chambers, of which two convey mucus and two convey blood. There are four vessels within the temples or skull. From these the eyes obtain their blood. The four vessels divide inside the head and spread toward the inner part.'

"The Berlin papyrus speaks of the division into thirty-two vessels within the skull and implies that air traverses at any rate some of them. Returning to Eber's papyrus, 'When the breath enters the nostrils it penetrates to the heart and to the internal organs and supplies the whole body abundantly.' This idea that certain of the vessels convey air you will observe is identical with the Greek conception and probably was its source. 'Three vessels traverse the arms and extend to the fingers, three vessels also pass down the leg and are distributed to the sole of the foot, a vessel goes to each testis and one to each kidney. Four vessels enter the liver, conveying fluid and air; these may be the seat of various diseases as they are mixed with the blood; four vessels convey fluid and air to the intestine and spleen; two go to the bladder and from them the renal secretion is produced. Four vessels convey fluid and air to the lower abdomen, going to the right and left sides; from them is formed the alvine excretion.' The vessels here described are clearly the iliac arteries and veins. 'When the heart is diseased its work is imperfectly formed; the vessels proceeding from the heart become inactive, so that you cannot feel them' (no doubt this is a reference to changes in the pulse), 'they become full of air and water. When the heart is dilated the vessels from it contain effete matter. If a suppurative or putrefactive disease occur in the body' (abscess, I imagine, for which various sites are suggested) 'then the heart causes it' (apparently the purulent material) 'to traverse the vessels, fever or inflammation of various kinds occurs in the body, the heart is in a morbid state while the fever continues. In heart disease there is either disturbance of the action of the heart or the heart is congested or overfilled with blood, the heart is moved downward, comes nearer the precordia, and suffers weakness and nausea. When the disease affects the base or lower mass of the heart there is shortness of breath, the heart is displaced on account of the volume of blood from the abdomen' (probably the old idea of the rush of blood entering the heart from the liver). 'There may be fever or inflammation of the heart.' Now here comes a passage of some therapeutic interest. 'The heart during such disease must be made to rest to some extent if it be possible.' Here we have wise advice from the ancient Egyptians, advice the importance of which we have scarcely as yet recognized and which we may to-day follow with advantage. 'If the heart is atrophied (or wastes itself) there will be an accumulation of blood within it. When the disease of the substance of the heart is accompanied by dropsy there is a lessening' (in strength probably) 'in the ventricle or cavity. When the weakness of the heart is due to old age there is dropsy. When there is raising or increase of the heart it presses toward the left side, it is increased by its own fat and is displaced; there may be

much fat contained within its covering or pericardium. If in a suppurative disease the heart is pushed forward it floats or sinks in the fluid and is displaced.' Here we surely have a reference to pericardial effusion. 'If the heart trembles or palpitates, has little power, and sinks downward, the disease is advancing. When there is much beating at the precordia, with a feeling of weight, when the mouth is hot and languid, and the heart is exhausted the disease is a fever or inflammation.' In another place (folio 102) the heart is spoken of as being full of blood, which comes or flows from it again. In folio 39, after a description of symptoms, follows a statement to the effect that the heart is distended, the sick man is short of breath, because the blood has stagnated and does not circulate. This is an interesting expression, but judging from other parts of the papyrus the word translated circulate can only have a vague meaning, implying movement to and fro, just like the expression *περιβόος αλφειος* in the Hippocratic writings, which seems to imply the circuit of the blood, but in reality has only a similar indefinite meaning. It is evident that the Egyptians knew that blood flowed from the heart, but, like the Greeks, they never seem to have realized that the heart is a pump, nor did they recognize valves."

SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE.

Stated Meeting, held Thursday, May 19, 1904.

The President, Andrew H. Smith, M.D., in the Chair.

Fever Curves of Scarlatina and Measles.—Dr. A. A. Berg said that the fever curves of measles and scarlet fever are quite as typical as those of typhoid fever or smallpox. This is not usually stated in the text-books, but will be found absolutely true in typical cases. There is the stage of accession, that of fastigium and that of defervescence. Each of these may occupy from hours to days. The beginning of fever is sometimes spoken of as prodromal, but it does not precede the eruption which is already present on the mucous membranes. In the eruptive stage it must not be forgotten that the fever is first enanthematous and then exanthematous. In measles, during the enanthema, the pyrexia is marked and it may last for from two to five days. Then there is a sharp decline. On the first day of the exanthemata in measles the pyrexia is one degree higher than before. On the next day it is still a degree higher. Usually on the third day it is at its highest and only then is there a drop. The drop is always noticed to occur in the morning.

Scarlet Fever Curve.—The febrile curve of scarlet fever is much simpler, yet it is characteristic. The enanthematic eruption is followed by the exanthem in six hours to, at most, a day. The top notch of the fever is reached on the first day of the enanthem. This never occurs in measles. The exanthem is followed by a drop of two or more degrees. When the eruption is extensive, the temperature may rise half a degree more, but the defervescence is usually maintained. Scarlet fever declines by lysis and never resolves by crisis. The access is sudden and the fastigium lasts from five to six days with staircase descent. Scarlet fever is said to occur occasionally without fever, but this Dr. Berg has never seen. The curves of these diseases are always typical, and whenever there is a departure from the normal some reason for the exception can be found. When the decline of the fever in measles does not take place by crisis, some complication may be looked for, usually pneumonia or nephritis. An irregular curve should always give rise to suspicion. When regular

descent by lysis is interrupted in scarlet fever, a complication should be feared. The temperature curve may readily be made a test for the value of antitoxin. The normal curve in diphtheria is easy to recognize, and after the administration of antitoxin there is a critical defervescence which takes place in twelve hours. This is quite an exceptional incident in the fever curve and indicates the thorough effect of the serum. No such critical defervescence occurs after the administration of Marmorek's or Moses's serum for septic infection, showing that the action is evidently of quite different nature. High fever in children's diseases may require treatment. Cold or cool baths or cold sponging or cold packs are the most recommended. Antipyretic drugs are scarcely justified in children. The temperature cannot be reduced as in typhoid fever or pneumonia, for the reaction of the cutaneous circulation is different. The patient's nervous system can be calmed best, however, by hydrotherapy. Owing to the irritation of the skin, the capillaries are much more dilated and will not contract under the influence of cold. Hence, there is neither the primary contraction nor the secondary dilatation seen in other fevers. It must not be forgotten that the blood is loaded with toxins and that the eruption is eliminative in character. Accordingly the encouragement of gentle perspiration in mild cases by a warm bath with a dry pack will often be found very efficient.

Technic of Bathing.—The bath should be given at about 80° F., not lower, and raised to 90° while the patient is kept in it for ten minutes longer. This makes a warm bath, though the temperature of the water is lower than that of the skin. Then the patient should be wrapped lightly in a sheet or light blanket and put to bed. In order to have the warm water mixed properly with the cooler water in the tub, when the temperature of the bath is being raised, the warm water should be poured to the bottom. No rubbing should be practised, as in typhoid fever, as this will only cause premature desquamation and practically produce small ulcers. A large, soft sponge may be used, or the skin may be patted with a soft towel.

Curve of Enanthemata.—Dr. Koplik said, in discussing the paper, that as yet the curve of the enanthematic stage of the fevers is not known. The prodromal curve of the infectious fevers is not characteristic, and from a look at the temperature sheet a little patient might easily be suffering from tonsillitis, when one of the infections would be suspected. That there is a critical drop of the temperature in measles has long been known and classical cases are reported in the text-books. Uncomplicated cases, however, do not always conform to the type, and notwithstanding febrile anomalies there may be no complications in the ears, throat, lungs nor gastro-intestinal tract. Suspicion should always point however, to one of these. Dr. Koplik has never seen a case of measles without a temperature, though in one typical case the temperature was only 99.8° F. by the rectum. When scarlet fever drops very slowly, an enlargement of the lymphatic glands may be found, usually due to an acute dermatitis. There are so many variations from the type, however, in different ways that the temperature curve cannot be considered of great value in diagnosis or prognosis. The therapy must not be based on the thermometer, for cases are very individual and some children suffer severely at a temperature at which others are quite comfortable.

Postcritical Temperature.—Dr. Lambert said that in measles there is usually a distinct crisis, but it is not uncommon to have a rise in temperature afterward up to 100° or 101° F. without complications. He has seen two cases of typical measles run their course

without temperature. They had complete desquamation in six weeks and yet at no time was the temperature curve above 99° F. Scarlet fever may come down very slowly and yet no complication be present. The febrile course may be two weeks without complication. In such cases desquamation goes on during the febrile period and the patients need to stay no longer in the hospital. The temperature of scarlet fever is as irregular as typhoid, and Delafield said that nothing was too irregular for typhoid.

Opposite Febrile Charts.—Dr. Northrop said that the fever of measles and scarlet fever is quite typical, so that it is possible to write the chart beforehand in most cases. If the charts are on lantern slides it would be only necessary to start them from different ends in order to have the different courses of the two diseases. A combination of the two makes a typical smallpox chart. Antipyretic treatment should be directed not by the thermometer, but by the patient. There need be no fear that the eruption will strike in because of the application of water. It is important in these cases to keep the feet warm and the head cold.

Dr. Berg, in closing the discussion, said that some children play lustily with a temperature of 103° F. The measles fever chart has its exceptions, of course, but it is as typical as typhoid. The point in bathing that Dr. Berg would insist on is that the temperature should be raised at the end, beginning at lukewarm. This is better than the bath at 70°, or even 60° for reducing temperature.

Definite Information as to Radium.—Dr. H. G. Piffard said that there has been a vast amount of misinformation furnished by the daily and weekly press with regard to radium, and that as a consequence there is a reaction against the possibility of its being of any benefit in medicine, which is not justified by the true results of investigation. The radium rays consist of three kinds, the alpha, beta and gamma rays. The alpha rays exist in the largest proportion, but have very little penetrating power. The beta rays are smaller in amount, but have more penetrating power and, in Dr. Piffard's opinion, are like the cathode rays of Crookes's tubes. The gamma rays seem to be the same as the X- or Roentgen rays, existing in small amounts but have great penetrating power. The alpha rays are affected by a magnet, being attracted to it. The beta rays are also affected, but are deflected; the gamma rays are non-deviable by magnetic attraction. Besides the radiations there is an emanation from radium. The emanation from radium consists of material particles and is not merely a disturbance in the ether, as are the radiations. If the emanations are allowed to continue for several days the substance given off proves, on careful investigation, to have the properties of what is known as element helium. This is a material found first in the sun, and hence called helium from the Greek word for sun, but which has since been discovered also on earth. These emanations will not pass through glass, though needless to say the radiations will penetrate it to a considerable degree. The main source of radium is pitchblende, a material found in abundance in Austria but also in various parts of this country. The French physicist Becquerel found that there was something in uranium derived from pitchblende which effected a photographic plate, when presumably the plate was thoroughly protected from chance exposure by a light-tight cover. Madame Curie, in the course of some investigations of pitchblende, found a substance even more radio-attractive than uranium and, later, discovered radium. At the present time it seems not unlikely that radium is a definite element, though probably polonium is only a chemical compound with borrowed radio-active

properties. It has been thought to be a disintegrating product of radium, or a radio-active compound of bismuth, or tellurium. The fact of radiation can be discovered by means of a photographic plate, but the amount of radiation is much harder to determine. By means of an electrometer, however, substances having radio-activity up to 100,000 or even 200,000 Ms. as the term is, that is, having that many times the radio-activity of the same amount of uranium taken as a unit, can be measured. For higher powers of radio-activity chemical data are the only ones available.

Glow in Darkness.—Neither the emanations nor the radiations of radium are properly responsible for its glowing in the dark. This may be due to the presence of some other substance, such as barium. It may, however, be due to the effect of radium on the nitrogen of the air. The spectrum of the glow of radium is almost the same as that seen from nitrogen under certain conditions. Radium has the power of exciting fluorescence and phosphorescence in other substance. As a sequence of this the placing of a phial containing some radium in water was supposed to render the water radio-active. This was claimed to have possibilities of wondrous effects in medicine. These claims, however, are absolutely groundless. No radio-activity can be produced by the exposure of water to radium in this way.

Absorption of Rays.—Radium kept in glass tubes is not in the most favorable condition for it to exert its activity, since the glass absorbs most of the radiations. Besides, if there is the slightest flaw in the glass, the emanations from the radium gradually force their way through and for a time the metal loses its radio-active power. Aluminum makes a much better container than glass, for such a tube will not rupture, but the emanations succeed in leaking through even the pores of the aluminum. Hence the aluminum tubes are enclosed in silver tubes. Something of this difficulty can be overcome by an arrangement to modify electric tension by sealing a platinum wire into the tubes.

New Elements.—The discoveries with regard to radium and cognate substances have given rise to new enthusiasm for certain forms of chemical investigation. As the result two new substances, carolinium, named after the State of North Carolina, and berzelium, called after a Swiss chemist, have been discovered in thorium. These are the radio-active substances in thorium, which is very familiar as the substance that glows in Welsbach mantles. Pure thorium itself is not radio-active. Physical investigations have also shown a number of interesting facts. Alpha rays are very probably positive electrons, that is, material particles having about twice the size of the atom of hydrogen. Beta rays, on the other hand, are subatomic bodies, negative electrons having a constitution about equal to 1-1000 of an atom of hydrogen. Gamma rays are undulations in ether and are probably not corporeal. The beta rays or negative electrons have the same character, in Dr. Piffard's opinion, as the cathode rays, but have a greater velocity. It is the cathode rays that occur with the X-rays which Dr. Piffard believes to be the cause of the so-called X-ray burns. Radium itself is really a transcendentalized pocket edition of the X-rays. The substance to be obtained with any assurance must be bought of a reliable firm, for Dr. Piffard has found that in one place at least radium sold as having forty M radio-active power, proved, on investigation by himself and confirmation by Madame Curie's laboratory, to have less than one M of radio-active power.

Therapeutic Value of Radium.—Dr. Robert Abbe said that as the result of the reaction from the exaggerated claims for the therapeutic effect of radium there

has come a state of nihilism with regard to its effectiveness in medicine and surgery. Dr. Abbe, however, is firmly convinced from personal observations that there is much in radium that is likely to be useful especially in surgery, and considers that it would be a great misfortune if its investigation was to be given up. It is a very subtle powerful agent acting on cellular energies in remarkable ways and coming somewhere between the X-rays and Finsen rays in efficiency as regards modification of biological processes. The study of its effect on cell life is very striking. If twenty seeds be exposed for four days near a tube of radium and twenty other seeds for two days and twenty further seeds taken as controls and all sixty planted, those that have been exposed to the radium will be very much retarded in their growth, the seeds that have been longest exposed being most retarded. Just what has taken place in the seedling is very hard to determine, but the effect is easy to see.

Effect on Animal Life.—If the grubs of certain insects be exposed to radium a very curious result ensues. Some of the grubs will die, others, however, will be rendered somewhat sluggish in their movements, but the most curious effect will be a failure to go through the ordinary transformations which would make of them successively pupæ and winged insects capable of reproducing their species. If meal worms, for instance, are exposed to radium for some time, instead of entering on the pupa stage and then developing into beetles, they will remain as meal worms and continue to feed, while control meal worms that have not been exposed to radium will become beetles, laying eggs which in turn become meal worms and then beetles for three or more generations. The original exposed meal worms are still alive—Methusals of their species—showing no tendency to go through the cycle of development natural to them. These facts are most interesting for the physiologist and for the physician and surgeon who are brought face to face with the problem of the reduplication of cells which brings about the process known as malignant growth.

Effects on Healthy Skin.—Dr. Abbe exposed the healthy skin of a patient suffering from slow running cancer, which did not require immediate removal to the action of radium. The result was a destruction of cells for a quarter of an inch beneath the radium. In portions of tissue affected by the malignant growth the nests of cancer cells were found to be disorganized and destructive necrosis with liquefaction or melting away of the cancer tissue was found to have occurred. In a large recurrent nodule of carcinoma, nineteen applications of radium in a period of three months reduced the growth to one-third of its original size. A portion of this removed, showed the occurrence of fibrous induration and a great reduction in the number of nests of cancer cells, though some of the true cancerous material still remained. In the treatment of a giant-cell sarcoma of the lower jaw in which only a shell of bone was left and three teeth were loose, exposures to radium, the tongue being protected by lead, gradually brought about great improvement. The exposures were made three hours at a time for fifteen applications and the patient is now apparently cured. The progress of the disease has ceased and its growth has been retarded evidently in something of the same way as that of the seeds and the meal worms.

Other Therapeutic Uses of Radium.—Some milder affections yield promptly to radium. Dr. Abbe has seen a case of long-standing lupus cured by one application. Warts can be made to disappear like magic after a single exposure to a reasonably strong radio-active sample of radium. Nests of warts such as

occur in certain persons, have been made to disappear in four applications. The use of it produces a retrograde metamorphosis that leaves absolutely no scar after it and gives the best possible cosmetic result in such cases. Dr. Abbe has found this true also with regard to cancer nodules and in the case of the sarcoma of the jaw. The result is better than could possibly be obtained by any surgery, however careful. Of course it is possible that growths may recur. The use of radium repeated will doubtless do what it did at first; if it does not, then something can still be accomplished by the use of the knife and the patient is, as a rule, in no worse condition than at the beginning of treatment.

Radium and Parthenogenesis.—Dr. Piffard, in closing the discussion, said that undoubtedly investigation will bring out very clearly the value of radium. The present nihilistic reaction is unfortunate, but is as far from the truth as the exaggerated significance originally given to the material. To offset Dr. Abbe's description of the effect of radium in retarding reproduction, Dr. Piffard said that it had been found that the exposure of certain of the ova of the lower animal forms to radium brought about their growth without conjugation,—that is, gave examples of parthenogenesis where normally these did not occur. This is of course only what Professor Loeb succeeded in doing with certain chemical irritants at the University of Chicago, but it shows the profound modification of biological processes that may be brought about by radio-active influences.

BRITISH MEDICAL ASSOCIATION.¹

Seventy-second Annual Meeting, held at Oxford, England, July 26, 27, 28 and 29, 1904.

(Continued from Page 384.)

In the newer ships refrigerating rooms are now supplied, and by this means fresh provisions may be carried, especially for short sea trips. As regards the nutrient value of the naval dietary, if one only takes the daily ration of beef, bread, vegetables, and sugar, each man is supplied with 291 gr. of nitrogen and 5,425 gr. of carbon; this, with the other ingredients of a sailor's dietary, comes well beyond the limit laid down by Parkes and Playfair of 307 gr. of nitrogen and 4,700 gr. of carbon, which an average man gives off in a day. It is also very much beyond the scale allowed to convicts doing hard labor (263 gr. of nitrogen and 5,003 gr. of carbon).

Meal Hours.—Since October 1, 1903, the Admiralty have recognized five meal hours, the aggregate time allowed being three hours, thirty-five minutes, instead of two hours, thirty minutes allowed by the old system for three meals. The meal hours are: An issue of cocoa on turning out at 5 A.M.; breakfast at 8 A.M.; dinner from 12 to 1:15 P.M.; tea at 4:15 P.M.; and supper at 7:30 P.M. These hours are very well arranged. In the tropics it is customary to have a two-hour dinner hour, with light work afterwards, the heavy drills being got through as a rule before breakfast.

Medical Officers with Regimental Unit in the Field.—Major T. D. F. Donegan said that the distribution of medical officers in the field is, to say the least of it, a difficult problem and one which requires a great deal of thought and consideration. In the various returns which go in to higher authorities the allotment of these officers is referred to, and it is quite natural to suppose that a practical distribution may not appear to be a right one to officers far away in a high administrative capacity. The senior medical officer of a force

should have power to utilize his medical officers as he thinks best, and to send them where they are wanted, instead of the present cast-iron allotment per regiment. The duties of a regimental medical officer in the field are as follows: (1) To be with his unit under fire in charge of regimental bearers; (2) to see the morning sick of his corps, and to send such sick, other than those suffering from minor ailments, to the brigade field hospital; (3) to attend to the sanitation of the camp, as far as it pertains to his own unit. Now the first of these is to his mind the most important duty, therefore if the unit is not likely to be detached by itself it does not require a medical officer, as its sick could be seen by the nearest bearer company or field hospital, sanitation could be attended to by a brigade sanitary officer, and its actual wounded in the field could be looked after by the bearer company. His proposal is the modified one as follows: With an ample supply of medical officers, when the establishment of bearer companies and field hospitals is complete, when casualties in either of these units are provided for, then to post to each unit a surplus medical officer on the understanding that his appointment is temporary and that he can be withdrawn the minute he is required elsewhere. As regards the equipment issued to these officers, it is at present excessive. Field panniers with operating cases are cumbersome, unnecessary and useless, as assistance is always required before any operation can be done. As the hospitals or bearer companies are the places for operations there is no necessity for a single medical officer to carry, regimentally, the equipment necessary for amputation at the hip-joint, as the only thing he may ever have to do single-handed would be the ligature of an artery, and, perhaps, the relief of a strangulated hernia. If the present field panniers contain more than is necessary, the field companion (and its own companion the water bottle) is hardly enough. In his report on the Eighteenth British Field Hospital in South Africa, he suggested that the regimental medical case should contain as follows: Modern tooth instruments, a surgeon's pocket case, some Spencer Wells forceps, retractors, tourniquets, ligatures in bottle, chloroform in capsules (as used by Boers), two waterproof sheets, two small dressing trays, some antiseptic tabloids, adhesive plaster, bandages and dressings, and syringes. For medical assistance the following may be added: Two thermometers, one aluminum stethoscope, one hypodermic syringe, with spare needles, a tabloid case of medicines, and a strong candle reading lamp, some spare bandages in waterproof bags, some surgical dressings, and some medical comforts would also be required.

He further spoke of hospital and ambulance service equipment.

Sterilization of Infective Discharges and Utensils on Field Service.—Lieutenant-Colonel A. M. Davis, in dealing with this question, said that the best mode of dealing with infective discharges, when on active service in the field, will probably vary according to circumstances; it will not be advisable to lay down one hard-and-fast rule to be of universal application. The four following methods are the only ones that are likely to be carried out in practice: 1. Burial in earth, either in deep or shallow trenches. 2. Treatment with disinfectants, followed by burial. 3. Sterilization by moist heat, followed by burial. 4. Destruction by fire—that is, incineration.

(1) Burial in shallow trenches (less than 24 inches in depth) is better than scattering the dejecta about on the surface of the ground, but is not to be recommended if it can possibly be helped. Burial in deep trenches (over 2 feet) is not so likely to pollute the

¹ From advance sheets of the *British Medical Journal*, by courtesy of the editors.

air, but will pollute the soil quite as much as burial in shallow trenches; indeed, more so, and for a longer time; this also is not to be recommended.

(2) Treatment with disinfectants, and then burial, lessens the risk of polluting the soil and air; but it is difficult to ensure their thorough application to solid excreta, and the length of time required for the complete action of moist disinfectants (necessitating the retention of the excreta for perhaps some hours) causes great practical inconvenience. Although better than simple burial, this method is not to be recommended if it can be helped.

(3) Sterilization by moist heat—that is, boiling—is undoubtedly efficient. All pathogenic bacteria that come under practical consideration are entirely destroyed by a temperature short of boiling. Solid and liquid excreta, infected ablation water, utensils of all kinds that have been fouled (bedpans, urinals, spitcups, etc.)—in short, everything that is infective can be rendered innocuous by this method. Two points are to be borne in mind: (1) the quantity of fuel required is large; and (2) the material disinfected (or at any rate a considerable proportion of it) remains to be disposed of, by burial or otherwise.

(4) Destruction in a furnace, that is, incineration, also requires a considerable quantity of fuel; but the offensive matters are rapidly and completely destroyed, leaving nothing that needs to be removed for burial. This method is equally as efficient as the last mentioned, so far as it goes; and the choice between the two resolves itself into a comparison of (a) quantity of fuel required, (b) extent of applicability or degree of usefulness, and (c) ease and inoffensiveness of working in each case.

(a) The quantity of fuel required should be less in the case of a destructor or incinerator than in the case of a boiler, because dry rubbish of all kinds can be used as fuel for a destructor. The saving of fuel is, however, not so great as might be expected, because (1) the temperature to be attained in a boiler is only 212° F. ($=100^{\circ}$ C.) at the most, while in a destructor a temperature of at least 850° F. ($=450^{\circ}$ C.) must be reached in order to actually burn up the material. (2) The presence of even a small quantity of moisture in the substances to be burned adds largely to the quantity of heat required (that is, fuel necessary); for, whereas to raise a pound of water from the ordinary temperature (say 15° C.) to boiling temperature (100° C.) requires $100-15=85$ units of heat, to convert that pound of boiling into steam (which, of course, is a necessary preliminary to incineration) requires 537 units of heat, making a total of $85+537=622$ units of heat. (3) If incineration is attempted, the high temperature must be maintained until everything is burned up, which in practice leads to the consumption of a great deal of fuel, much more than the theoretical quantity required; in the case of boiling when the temperature is once reached, a very small amount of fuel is required to maintain any given quantity of water at that temperature. From these considerations it appears that the saving of fuel would be slight, if any, in the case of incineration.

(b) As regards extent of applicability, or degree of usefulness:—Boiling renders harmless (1) all infective discharges of whatever description, liquid or solid; (2) infected ablation water; (3) infective utensils; but it does not deal with (4) ordinary non-infective excreta; nor with (5) rubbish or dry refuse; and (6) the infected discharges and ablation water remain (after disinfection) to be taken away and buried, or otherwise disposed of. A considerable proportion, however, of the fluid is got rid of in the form of steam.

Incineration destroys (1) all rubbish and dry refuse matter; (2) solid excreta, both infective and ordinary; and (3) some proportion of the liquid excreta (the amount depending on the size of the apparatus); but it does not deal with (4) infective liquid discharges, urine, etc. (if large in amount); nor with (5) infected ablation water; nor (6) infected utensils.

Ablution water and slops must, however, necessarily be removed from the immediate neighborhood of a properly managed hospital, in any case; and it is certainly better that they should be removed in a disinfected than in an infective condition. It is true that liquid disinfectants might be used to render them innocuous; but disinfection by heat is safer, and where fuel is procurable is to be preferred. The same may be said in regard to utensils. Assuming then that liquid sulliage has to be removed in any case, the additional bulk of material to be removed, if boiling be the method adopted, (that is, solid excreta that would otherwise have been incinerated) is practically negligible. There remain the cost and labor of removing rubbish and dry refuse, and ordinary non-infective solid excreta; this has to be set against the cost and labor of their incineration.

(c) As regards ease and inoffensiveness of working: Indian experience is unfavorable to the use of incinerators for destruction of excreta; very numerous patterns have been tried during the last fifteen years, and in no case has a thoroughly satisfactory result been obtained. In South Africa, however, they were used with success in many instances. But the preponderance of medical opinion, derived from South African experience, appears to be in favor of boiling as compared with incineration.

In circumstances where fuel is scarce, any form of heat disinfection may be impracticable; in such cases, deep burial, after treatment with chemical disinfectants, is to be recommended for infective discharges, etc. But if fuel is available, moist heat (that is, boiling) appears to be, on the whole, preferable to dry heat (that is, incineration).

The apparatus that has been devised by Major H. A. Cummins, C. M. G., R. A. M. C., for disinfecting excreta and utensils by boiling, is convenient in form, portable and easily worked. There is no smell during the process of disinfection. It is estimated to be capable of dealing with the excreta, slops and bedpans, of about 100 acute cases of enteric fever during the twenty-four hours. Its weight is 2 cwt. 3 qr. 24 lb. (say 3 cwt.), and its over all dimensions are 3 ft. 6 in. by 4 ft. 9 in. Experiments have shown that in ordinary weather about 50 lb. or 60 lb. of coal suffice for a working day of eight hours; in windy weather about 80 lb. of coal are required. Wood or other fuel may also be used.

The Recruiting Problem.—Major W. C. Beevor, in a paper on this subject, brought out the various difficulties encountered in Great Britain. As the problem is distinct from the American problem, we omit further consideration of his interesting and suggestive paper.

(To be Continued.)

OBSTETRICAL SOCIETY OF PHILADELPHIA.

Stated Meeting, April 7, 1904.

The President, Dr. R. C. Norris, in the Chair.

New Operation for Puerperal Sepsis.—This paper was read by Dr. Swithin Chandler, who, after making a few preliminary remarks regarding the causes of puerperal sepsis, described his new operation for puerperal sepsis as follows: Make an incision posterior to the cervix in the posterior vaginal wall; then pass a pair of long blunt-pointed forceps, slightly curved, in the cervical canal, up into the cavity of

the uterus; then puncture the posterior wall of the uterus in the center near the top of the uterus. Then introduce with two fingers a piece or strip of iodoform gauze in through the posterior vaginal opening previously made, clasp the gauze with the forceps and drag the same through the uterine wall and out through the vagina. Repeat this by puncturing the uterus on each side, but posterior and just about the middle of the body of the same, drawing the gauze through the same as in the first attempt. Thus one will see the uterus is treated as a thoroughly infected organ deserving heroic treatment. He then gave a few statistics regarding the mortality of other operations in puerperal sepsis. The objections which he thought might possibly be offered to his operation were: (1) All cases are not those of virulent infection; (2) it causes additional injury to an organ infected; (3) curettage and removal of membranes are often sufficient; (4) it may so injure the uterus as to interfere with labor.

Regarding the first objection it is admitted he would not always advise its immediate undertaking. As to the second objection, while it makes more injury, no hesitation is felt in opening an infection in other organs, and one has no more infection, and experience in this operation is similar to operation in other parts. To the third objection, as to the first, he would answer, if one is prepared to operate immediately if required, well and good. In answering the fourth objection, as yet he cannot say, but he does not believe it would have any bad results, especially after knowledge of how the uterus is treated by the inexperienced in curettage, removal of growths, etc. In favor of the operation Dr. Chandler claimed the following: (1) It is conservative; (2) it is by the experienced easily performed; (3) it is logical, because it treats the organ as an infected part, gives drainage to the uterus and those tissues and vessels shown by post-mortem examinations to be affected; (4) the mortality is greatly lowered, and it gives far superior results so far, although its exact results must yet be proven by a larger number of cases than as yet I have practised upon.

Dr. Chandler closed his talk with a report of a few cases operated upon in the manner above described, a description of the results obtained, etc. (See MEDICAL NEWS, August 6, 1904, for Dr. Chandler's paper.)

Dr. George M. Boyd said, in the discussion, that every contribution to the treatment of puerperal sepsis is of interest. He said that this method and the method which has been described by Dr. Pryor had seemed, in his opinion, heroic treatment in this class of cases. We occasionally have a death from puerperal sepsis, but the majority of cases recover. Many of the bad cases have a general systemic infection with only a local manifestation of infection. In the cases that have not recovered he has felt that the infection was beyond the uterus and that the patients died from a general systemic infection. He is not prepared to endorse the operation that has been suggested.

Dr. W. Reynolds Wilson, in the discussion, said he had always felt that the way to approach this subject is from the point of view of diagnosis. To be sure, there are cases that are desperate, and cases which will require what Dr. Boyd has chosen to call heroic measures, but it is very difficult to diagnose such cases in time to carry out such an operation. The bacteriological study of the case, he thinks, is extremely important. The localized pelvic infections with the presence of the staphylococcus and lymphatic engorgement involving the parametrium are cases which in the beginning present very severe symptoms, but which when properly treated by non-surgical means usually make a very rapid re-

covery. At the same time it is difficult to differentiate these cases from cases of overwhelming rapid infection, infection which begins early and which spreads into the system before we are able to institute any local treatment. That being the case, it seems to me there is required a very acute knowledge of the course of such infection, a knowledge which most obstetricians will find it very difficult to get. He thinks there is not enough infection nowadays to make it possible to draw the fine lines in diagnosis. He can understand perfectly well that the uterus may be the site of infection, that pelvic drainage may in certain cases interfere with the further spread of the disease. At the same time his mind is recalled to the first case that Dr. Chandler described, in which a mass of the placenta was removed under ether and in which he performed the operation. In that case it would be extremely difficult to tell whether the removal of the placenta itself might not have been sufficient to relieve the symptoms altogether.

Dr. R. C. Norris, in the discussion, said he had listened very carefully to Dr. Chandler's paper, and he thinks its gravest defect is his failure to indicate the class of cases requiring this kind of treatment. The same objections, intensified, are applicable to this treatment as to Pryor's operation. Pryor distinctly limits his to streptococcal infection, Dr. Chandler only speaks of "grave" cases. For cases of puerperal infection in the early stages, when it may be that the case is one of sapremia, which promptly recovers after clearing out of the uterine contents; for general blood or lymphatic infection and for uterine phlebitis Dr. Chandler surely would not resort to this measure and hope for success. If the infection is a virulent streptococcus and has passed beyond and is not confined to a localized area in the pelvis, as so frequently happens, surely this plan of treatment would not avail, as hysterectomy and the use of curettage have failed, as Pryor's operation has failed and as every other surgical operation has failed. Dr. Norris thinks Dr. Chandler should specifically state the class of cases in which he would consider this operation necessary; and he would be glad if he would furthermore point out to the obstetrician in what way these perforations of the uterus can accomplish drainage of that organ more efficiently than an intrauterine gauze drain. Dr. Norris is convinced that there are very rare cases of beginning peritoneal infection following abortion and labor, due to leakage from the tubes, that cul-de-sac drainage might save, if we could diagnose them by any means, clinical, bacteriological or otherwise. If the channels could readily determine through which the infection is spreading and how far it has spread, the obstetrician would know when and what cases to drain and attempt to avert a fatal termination. So far as his experience goes, that cannot be determined. He has gone over this ground in the discussion of Dr. Pryor's paper. Until Dr. Chandler designates more certainly in what class of cases he advocates the use of this methods, Dr. Norris thinks it is distinctly dangerous teaching. He speaks of it adding to Dr. Pryor's operation in that the uterus is also drained. The uterus can be drained as efficiently and certainly with less danger without making useless perforations through the uterus into the peritoneal cavity. Gauze passing from the cavity into the vagina will drain the uterus as well as three pieces of gauze that perforate the uterus and pass into the peritoneal cavity, without the serious danger attendant upon the latter. He cannot conceive why any one would perforate the uterus, expecting to secure better drainage of the uterus. He can see no advantage and only dangerous surgery in the operation, and he would like Dr. Chandler to convince the obstetrician that his

patients recovered because of and not despite his operation. Dr. Norris feels that he adds grave danger by carrying from an infected uterus a gauze drain into a peritoneal cavity that may be free from infection. His judgment is that it adds a distinct risk in the treatment of any case. He should feel quite as inclined to treat a case in this manner as he would, in a case of beginning sepsis, to open the abdomen and cul-de-sac and insert a loop of gauze with the hope of saving life. If it is drainage we are striving for, why stop with the uterus and cul-de-sac? We must remember that drainage is not going to save every case of sepsis. It is utter folly to attempt to drain the pelvis or even the uterine cavity if the infection has already spread beyond. It is risk enough to open the cul-de-sac, but this is doubled by perforating the infected uterine wall and inserting gauze into the peritoneal cavity. Dr. Pryor's operation is only done in cases of streptococcal infection. Its employment is based upon bacteriological study and he has limited his cases to that class. Dr. Chandler has not done so. He simply speaks of "grave infection." The mere finding of streptococci does not tell how virulent the case is. Dr. Norris has repeatedly found streptococci in the uterus after labor when the woman had no fever. He has also found them in women who had fever and who got well. The mere finding of organisms is not enough; the difficulty in selecting treatment depends wholly upon the question of diagnosis spoken of by Dr. Wilson. There are no means to predict the outcome in individual cases, no means more reliable than clinical to differentiate the gravity of our cases, and until that can be done, this method of relying wholly upon drainage and running the risk of infecting the peritoneal cavity should not go unchallenged. He considers it dangerous practice and believes that it would lead, in a large number of cases, to increased mortality. Relatively few cases would be saved by vaginal drainage, and these few would just happen to be appropriate cases operated upon at the right time. We have no accurate means of determining the appropriate cases early in the course of the disease and when that right time arrives. He thinks a word of caution should be sounded, and that the obstetrician should reserve pelvic and abdominal surgery for puerperal sepsis to cases with distinct localized lesions. To open the cul-de-sac or perforate the uterus and pack with gauze where no evidence of infection outside of the uterus exists, or when evidence does not exist that infection has spread to the lymphatics or venous systems, is the height of folly. The obstetrician should confine pelvic surgery in puerperal sepsis to localized infections. When no localized infection exists this method is unscientific. Even with the most skilful bacteriological examination we could not predict in any case whether it is a type of case that pelvic drainage will save. If Dr. Chandler operates upon a case when the infection has passed beyond the uterus and pelvic cavity, he helps the patient not one iota by opening the cul-de-sac, perforating the uterus and dragging three pieces of gauze from the opening in the vaginal vault, through the uterus and the cervix, making a U-shaped drain. If the infection is localized in the uterus the patient runs the risk of septic peritonitis, from which she may die, as the direct result of this treatment.

Dr. W. Reynolds Wilson, in the discussion, supplemented his remarks by stating his experience in hospital practice with cases of infection. He does not believe that one-half per cent. of the cases that begin as infected cases go on to septicemia, that is, to a fully developed systemic infection. The class of cases that it has been his experience to deal with have been:

(1) Putrefactive cases, in which there is intoxication from retained debris within the uterus. That is the common class of cases which he has observed. (2) Cases of parametritis, a simple lymphangitis, with edema of the broad ligament. In this class the expectant treatment has always been satisfactory. (3) Cases of the gonorrheal infection. These are the common cases in his experience based upon a more or less extensive observation, and in every one of such cases, were such treatment resorted to, the chance of streptococcal infection of the peritoneum would be imminent.

Dr. B. C. Hirst, in the discussion, remarked that he would like to add a word of condemnation of this proposition of Dr. Chandler, which cannot be based on such practical experience, and which is, Dr. Hirst thinks, distinctly dangerous. Indeed, it is difficult to criticize it as severely as it deserves, and yet to observe the courtesy of debate. He should object to a proposition of this kind appearing as read before the Obstetrical Society, unless accompanied by the criticism which is sure to follow. Dr. Pryor's proposal to drain the pelvis, to which Dr. Norris has referred at length, is more rational than is Dr. Chandler's, but it is founded on incorrect premises, and is not, to Dr. Hirst's thinking, the result of sufficient clinical experience with all forms of puerperal sepsis, and is wrong in principle. Dr. Hirst said he performed a good many exploratory incisions, especially in the early history of the operative treatment for puerperal sepsis. When in doubt in a case of metritis, whether the inflammatory product is in the uterine wall and is about to break into the peritoneal cavity, or whether it is contained within and limited to the wall, he still resorts to an exploratory abdominal section, as he also does in cases of pelvic cellulitis, to be sure there is no intraperitoneal involvement. From a considerable experience, therefore, in the inspection of the pelvic cavity in cases of sepsis, he is in a position to say that Dr. Pryor's premises on which he bases his procedure for opening the vaginal vaults are incorrect. The pelvic peritoneum is not immediately invaded in streptococcal infection, and is usually never invaded at all. Dr. Hirst has seen a number of cases of the gravest infection in which there was no involvement of the pelvic or abdominal peritoneum. The pelvic peritoneum is often entirely unaffected, and there is no serum in the pelvic cavity. If, therefore, Dr. Pryor's procedure is incorrect, Dr. Chandler's, he thinks, is totally unwarranted. The former will occasionally be followed by fatal peritonitis, which could otherwise have been avoided; the latter, if ever actually tried in practice, would be even more likely to cause death in this way.

Dr. F. H. Maier, in the discussion, said he did not hear all of Dr. Chandler's paper, but from the remarks of Dr. Norris he has gleaned the principle of his procedure in this class of cases, and he agrees with Dr. Norris that it is not one to be allowed to go unchallenged. Concerning Dr. Pryor's operation, there is no question in his mind that in a certain class of cases it is a most valuable procedure. Dr. Maier is inclined to think that in a certain number of systemic infections the lower pelvic cavity acts as a breeding focus from which fresh poison is sent out into the system. By opening into Douglas's cul-de-sac the obstetrician undoubtedly corrects a condition that would otherwise cause the death of the patient. And these are the cases, until the profession has better means of satisfying itself that there is nothing in Douglas's cul-de-sac, in which it will be good practice to drain.

Dr. Norris asked Dr. Maier how he would recognize that class of cases.

Dr. Maier, in answer, said until the profession had better means of recognizing this class of cases in which infection in Douglas's cul-de-sac with systemic infection was had, and where it does not respond to expectant treatment, he thinks it is well to make such an incision. He thinks there is very little danger and much good can be accomplished. He remembers one case a year ago, in which the attending physician had cleaned the uterus a week before. The case was brought to the hospital, and he thought the attending practitioner had not done a clean job. On going into the uterus, however, there was nothing there. Then a vaginal incision was made, and an opening into Douglas's cul-de-sac, and a lot of dirty serum was found. No cultures were made to demonstrate the organisms. The patient recovered after a protracted convalescence. In certain cases where the profession intuitively feels that something must be done, he feels that the Douglas's cul-de-sac can be opened with little added danger. He thinks the risk is worth the doing.

Dr. B. C. Hirst, in the discussion, said he would like to ask these gentlemen, particularly Dr. Chandler, what proportion of cases they think are infected in Douglas's pouch. A large experience is needed to decide this question. He thought the president, and himself, who had charge of large maternities, and who saw scores of these cases to one that is seen by the general surgeon or the gynecologist, without experience in obstetrics, were in a position to make a statement on the subject. He has rarely seen infection in the puerperium confined to Douglas's pouch. He had to operate on a large number of these cases every year. He doubts if any clinic in America had a larger number than his. In the last three days three of the most desperate cases of puerperal sepsis were brought into the University Hospital in the ambulance. He has usually four to six such cases under observation continually. Out of a large number, every year, he sees a very small proportion in which the infection is localized in Douglas's pouch. When one can determine its localization in Douglas's pouch by easily appreciable physical signs, the obstetricians all agreed that colpotomy is indicated, but to do this operation as a routine measure, simply because one don't know what else to do, and feels that something must be done, is a proposal discreditable to surgery.

Dr. Chandler said, in closing the debate, one would naturally think after the remarks which have been made that there would be some hesitation on his part, but so convinced was he that the operation is a logical one, that the opposition expressed only caused him to uphold it more zealously than had such opposition not manifested itself. He answered the arguments in their turn as they have been propounded by the different physicians present. In regard to the criticism of Dr. Boyd, he would state that the text of his (Dr. Chandler's) paper contains the answer. It is that the operation is advised in severe cases, or cases that in one's judgment are liable to become severe, and the paper states that the operation would not be employed in cases of mild infection or infection with the colon bacilli or with the gonococcus. It is only in the streptococci cases that the operation is advised. In regard to the second point, Pryor has reported cases in which he has operated, and in which the temperature fell immediately, and the patient recovered, showing that there was no systemic infection, or that it was not of such character that it killed the patient. And his operation, which in Dr. Chandler's judgment lacks some of the better qualities of the one suggested here to-night, has produced good results, unless one says that Pryor did not tell the truth, and he (Dr. Chandler) is not prepared to make

or even insinuate such a statement, and would refuse to believe a statement of that kind. Dr. Wilson spoke of cases of infection being very few, thereby intimating that the operation was for some obscure trouble, yet Dr. Hirst, in his discussion to-night, has stated that three cases have just entered the hospital with which he is connected. This, in Dr. Chandler's judgment, answers Dr. Wilson's question. While not altogether bearing on this point, and yet he feels it is apropos, he would like to say that there is a habit in discussing the cases in our city societies of citing only the cases which occur in the city, omitting any that occur in the country and suburban districts. What is applicable to the city in regard to the number of cases and their causes, etc., of disease, is not always applicable to those of the country, and vice versa. He would state, however, that he believes more of these cases occur in the country and in smaller towns than in the large cities. This is not in any way a reflection against the judgment and skill of the country practitioner. But he has such distances to travel and so many hardships with which to contend before reaching his patient, that in spite of his skill and judgment more cases do occur in his practice. Dr. Wilson spoke of the removal of the placenta in one of Dr. Chandler's cases. It is true, no one can say that the case would not have recovered with this simple removal, and it may be that the point is well taken. Dr. Norris has asked an important question: When do these cases need the operation? Dr. Chandler would answer that by asking whether Dr. Norris, or any other doctor, can always tell when a patient is ill from any trouble, when in the exact time, or what is the exact basis upon which to determine operating. Just as in Dr. Keen's paper on "Massage of the Heart," when he (Dr. Chandler) asked him how long he would wait before performing massage of the heart, he said that it was not time that was to be considered, but after a certain lapse of time, probably five or ten minutes, but he would not be held to that, as it was the general condition of the patient and other matters which would determine whether he would perform massage of the heart. With all things given, with the respiration over 44, and with an infection streptococcal in character, Dr. Chandler would not hesitate to do this operation, bearing in mind the general condition of the patient in this advice. The reason he spoke of respiration is because he believes this is a valuable indicator in this as well as in other troubles. A case was just brought into one of the hospitals, and after being there some little time was seemingly recovering, and on the day before the patient died the temperature had fallen to 98.2° from 104° F.; the pulse was almost normal; everything except the rapid respiration, which was between 50 and 60, pointed to recovery, and yet within a few hours the patient was dead. Dr. Norris also asked how this operation would give additional drainage, and why the operation was more logical than that of Dr. Pryor's, which seemed to him to be the more logical of the two. In the first place, the operation of Dr. Pryor's is not an operation of drainage, and he (Dr. Chandler) could not conceive that it does drain to any extent. On the other hand, if one considers the lymphatic system around the uterus, consisting of a jacket of lymphatics leading to two different trunks or cords which lead from the region of the cervix out through the broad ligaments, and nearer the fundus of the uterus, those forming a complete network of lymphatics surrounding these parts and leading from these parts to the general lymphatic circulation, he thinks the logic of how additional drainage is obtained is evident. The moment that one punctures clear through the uterus one punctures these channels, thus making open-

ing through which free drainage can occur. The operation is surely much more practical on account of this drainage than that of hysterectomy, which has been done with a mortality of 55 per cent. in selected cases. Dr. Norris also spoke of immediate spreading of infection. Dr. Chandler thinks this is one of the best arguments for the operation, for if it did not spread through all the lymphatics immediately, one probably would not be justified in performing the operation, because one might be the means of spreading such infection by injuring the uterus and its tissues, but since it is already infected that argument loses its force. Jacoby has reported 51 cases which were selected, every one of which showed infection of the lymphatics. Dr. Norris asks what Dr. Chandler means by "extremely severe cases." This is a point well taken. He (Dr. Chandler) cannot answer this otherwise than he has, except by saying, generally speaking, when a case had reached the danger line. There are some cases overwhelmed by infection in which one cannot tell the result. The profession has seen them go to the danger line and then recover. It may be that the lymphatics here may be more numerous than the lymphatics in other local parts, still one does not have any more general systemic infection following this operation than one has when entering other parts for operation, when such parts have been infected. Dr. Chandler remembers Dr. McLane Tiffany, of Baltimore, speaking before a meeting of railway surgeons several years ago, make the statement that the only way to cure a macerated kidney, or to save a patient, was to boldly cut into the kidney. Dr. Chandler thinks there is not a man in the country who would hesitate to do this now, nor would he admit that he would have more infection than if he did not so cut into the kidney, and in that case, as in these cases of sepsis, he probably would have death if he did not do so. In regard to bringing forth a warning, no one desires to protect the medical fraternity and the patients more than Dr. Chandler, but in these severe streptococcal infections, with a respiration over 44, and with every sign of collapse, with the full knowledge that every lymphatic in that part is infected, and he defies anyone to bring a case here that differs from those reported by Jacoby, he cannot see why any cry of warning is needed. On the other hand, he can see why it is wrong to stand by with a full knowledge of the case, and say one cannot operate, because one may make further infection, and this when the infection is upheld by every analysis and all the statistics that the profession has at its hands.

In regard to Dr. Hirst's remarks, his speech of condemnation is one only of condemnation to my mind, and not one of logic. He demonstrates in his text-book that in these conditions the uterus is a generally infected organ, and in this text-book he displays a uterus which he has removed in hysterectomy—the uterus seared from top to bottom. Both the picture and his description of the uterus leave their impression upon the mind, and Dr. Chandler would ask him how in the name of common sense is one going to reinfest an organ of that kind, and how much more logical is the operation which he has proposed than the one which he and others at one time advocated, that of hysterectomy, for in hysterectomy, in tying the uterus one ties up the lymphatic trunks or cords, thus tying up the lymphatics which have been infected so that the poison absolutely cannot get out, tying them up in a bag, as it were, with the result that the only exit that they have is in the general current, and, if possible, the result of a stronger and, therefore, a more virulent general infection. The mortality in hysterectomy, as has been mentioned before, in selected cases, is admittedly 55 per cent.

Dr. Chandler thinks too serious a view of this operation is taken. He believes that when it is realized that the uterus is a thoroughly infected organ, it is too serious a view and one not based on mature judgment and thought to speak of sending out warnings, and not desiring that this society should bear the burden of any such operation, as the gentleman has remarked. In answer to Dr. Hirst, Dr. Chandler thinks the operation he suggests is a logical one, because it does drain, and that is the endeavor to be accomplished, and he has tried to the best of his ability to demonstrate how it does cause such drainage. He will again call to the minds of the obstetrician the position of the lymphatics as they leave the cervix and uterus, and as they surround the uterus, and ask if there is any other method to drain, and is there anything more logical than to drain an infected organ. Again, if the organ has been generally infected, and that much be admitted, what can be the objection to letting out as much of that infected material and its poisons as is possible? In regard to Dr. Pryor's operation, Dr. Chandler does not think Pryor drains his cases. As to the proportion of infection in Douglas's cul-de-sac, it makes no vital difference whether the infection becomes located there or not. It is primarily in the uterus and lymphatics, and in mild cases it may not reach the posterior part of the uterus at all. In severe cases it may not cause an inflammation in Douglas's cul-de-sac, but in other severe cases it does. Patients do not die from infection of the cul-de-sac. If so, one-half of the patients with infected tumors of the uterus and surrounding parts would never reach the operator, because they would have died long before. It is the absorption through the lymphatics and veins that does the damage in these cases. In Dr. Chandler's judgment it is not a vital objection against the operation simply because one cannot tell or give the exact symptomatology when one operates. One might say in any case when to operate, but it depends absolutely upon other conditions present. That is exactly so in this case. In mild cases, with the temperature of 102° or even 103° F., with a respiration of 30, and with no seeming general systemic infection, he would not advise operating, but when a general infection is evident, because mortality in these cases, in spite of what has been said, is high, he sees no reason why one should stand idly by and allow patients to die—and with the results which he has so far obtained, with no logical arguments against the operation, he shall certainly proceed to operate, and will feel no fear of further infection while thus draining the lymphatic system by puncturing an already infected organ.

Tubal Menstruation. Internal Hemorrhage from Ectopic Gestation Without Rupture of the Sac.—The author of this paper is Dr. E. E. Montgomery, and it was read by Dr. P. Brooke Bland. The author reports the history of this case in order to strengthen the argument contained in his paper presented before this society at the October meeting, 1903, on "The Structures Taking Part in Menstruation." At this meeting a case of tubal menstruation was also reported by Dr. Bland. These two papers were written in collaboration. The history of the present case is as follows: The patient was operated upon for laceration of the cervix and a retrodisplacement of the uterus through the abdominal route. The day before the operation the patient's menstrual flow began, and in view of this fact, the author, therefore, carefully examined the Fallopian tubes to determine whether they actually took part in the menstrual process. His finding seemed to indicate that they do really participate in menstruation. In this case the tubes were darkened and congested. Pressure ex-

erted from the uterine toward the abdominal end of the tubes caused a few drops of blood to appear at their external orifices, and also small dark-colored clots were expressed. These were somewhat of the character found in menstruation. The author regrets that a microscopical examination of these clots was not made, because of the possibility of their having been associated with an ovum, and he also regrets that he did not examine the ovaries for indication of recent rupture of Graafian follicles. The case is presented, as heretofore stated, as additional evidence that the tubes are active in the physiological process of menstruation.

In this contribution the author desires to point out the constant danger of tubal pregnancy, in that serious hemorrhage may take place from the gestation sac without fracture of its walls. The first class of cases in which serious hemorrhage may occur without rupture is tubal abortion. Such a condition is usually followed by profuse and dangerous bleeding. The cavity is generally filled with blood which clots, and finally arrests the hemorrhage. Occasionally the separation of the fetal sac may not be complete, but hemorrhage occurs from the partial separation which makes its exit from the abdominal end and causes extensive hemorrhage. Finally, the weakened circulation will result in the formation of a clot which arrests the hemorrhage and saves the patient. The writer cites a case of tubal abortion. The patient had a characteristic menstrual history of pregnancy. She missed two periods, and upon coming under observation had been bleeding for several days. This bleeding was attended with severe pain in the lower abdomen. The patient at times had attacks of cerebral circulatory disturbance. Examination revealed a resistant mass to the right of the uterus. Diagnosis of ectopic gestation had been made, though the author from the appearance of the patient did not think the shock sufficient to indicate either rupture or tubal abortion. The patient was operated upon, and on entering the abdomen, the right tube presented a sac occupying the outer half of the tube, which was filled with clot, but showed no rupture. The fluid had escaped from the end of the tube, but an abortion had not really taken place. The other class of cases to which the author calls attention are those in which the villi of the chorion erode and penetrate the tubal wall, and even its serous covering, and thus bleed from the extremities into the peritoneal cavity. These projections are so small as to often only be perceptible by the microscope, but yet cause dangerous hemorrhage. He cites a case in which this condition was well exemplified. The patient was admitted to the hospital, quite anemic looking, complained of soreness over the abdomen, but had no marked tenderness or rigidity. Examination revealed a retroverted uterus, but little else could be determined. Blood examination showed red blood corpuscles 3,200,000, white 720,000, hemoglobin 70 per cent. Her temperature ran from 99° to 100°F.; pulse 96 to 104. This patient had passed one period but a few days when she was seized with severe pain in the lower abdomen, which was followed by bloody vaginal discharge. This had continued until her admission to the hospital a month later. The patient would at times have rather severe attacks of pain in the lower abdomen, particularly when moving about. At times she also became exceedingly faint and was obliged to remain in bed. She was operated upon, and upon entering the abdomen it was found filled with fluid and clotted blood. The right tube was occupied with a sac about the size of a small orange, which ruptured on being delivered, allowing the amniotic fluid to escape, and not blood. Examination of the sac did not reveal

any seat of rupture, except that caused on delivery, but on its surface several small, dark-colored hemorrhagic areas were noted. These upon opening the sac were found to be immediately over the cord or at the placental site. Microscopical investigations revealed that these dark-colored areas were the seat of hemorrhage, and were caused by the villi eroding and penetrating the tubal wall.

(To be Continued.)

BOOK REVIEWS.

THE AMERICAN YEAR-BOOK OF MEDICINE AND SURGERY
Edited by GEO. M. GOULD, M.D. Volume 2, Surgery.
W. B. Saunders & Company, Philadelphia, New York, and London.

THIS book forms a quite complete record of what has been done in general surgery during the past year. The plan of having specialists in charge of departments has been continued, and but few changes have been made in the editorial staff. Among the new names are those of Drs. Griffith and Gittings, in pediatrics; Drs. Pyle and Brown in ophthalmology, and Drs. Marshall and Rhein in legal medicine. A special endeavor has been made this year, which will be continued in the future, to place at the head of each chapter a summary of the more noteworthy advances and discoveries made during the year. These should prove of use to the reader in fixing the attention on the special trends of progress in such a vast mass of literature as appears each year in every branch of medical science. The book is well printed, illustrated and indexed, and contains the following departments. General surgery, by Da Costa and Gibbon; obstetrics, by Hirst and Dorland; gynecology, by Baldy and Dorland; orthopedic surgery, by Gibney and Watermann; ophthalmology, by Pyle and Brown; diseases of the nose, throat and ear, by Kyle and Fetterolf; anatomy, by Hamann. In each of these chapters, all important American and foreign contributions are completely abstracted and give to the Year-Book the character of an excellent work of reference of what has been published during the past twelve months.

BERICHT ÜBER 137 GALLENSTEINLAPAROTOMIEN AUS DEM LETZTEN JAHERE, etc. By Prof. HANS KEHR, J. F. Lehmann, München.

DURING the past year, Kehr examined 300 patients afflicted with gall-stones, among which he operated upon 137. The latter are reported in the above work, which also contains a résumé of the non-operative cases. Kehr prefers the oxygen-chloroform anesthesia, insists on the strictest asepsis and always washes out the stomach before operation. His total mortality was 16.5 per cent, this including the cases where other operations were also done. Among 68 straight gall-stone cases, the mortality was only 3 per cent. Kehr believes that every case of gall-stones should be operated upon, as a cure results in 97 per cent. of the cases, whereas medical treatment is followed by cure in only 72 per cent. As a matter of fact, however, he only recommends operation when the history or the physical examination points to an empyema, a hydrops, or a chronic closure of the ducts. Otherwise he is guided by the frequency and severity of the colicky attacks, and also by the social status of the patient. In about two-thirds of the cases which consult him, he does not operate. Kehr does not believe that any spontaneous cures result from medical treatment alone.